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THE COAL AND IRON RECORD.

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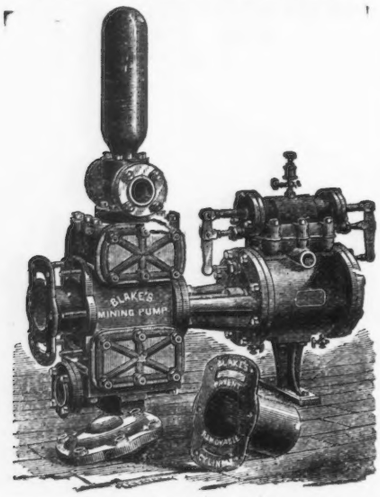

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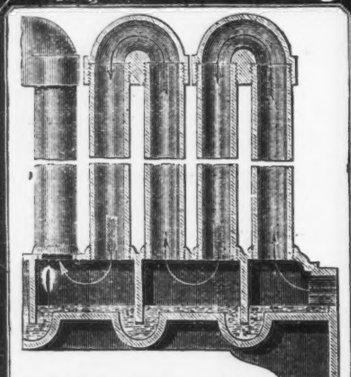

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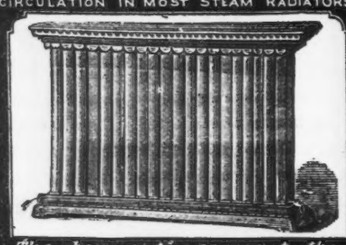

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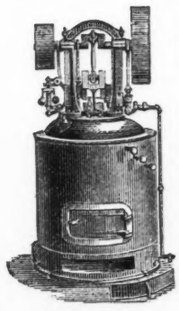

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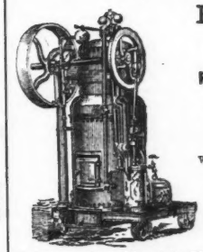

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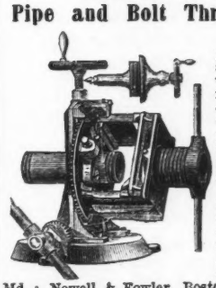

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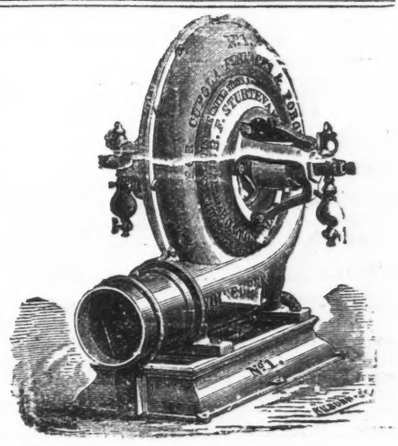

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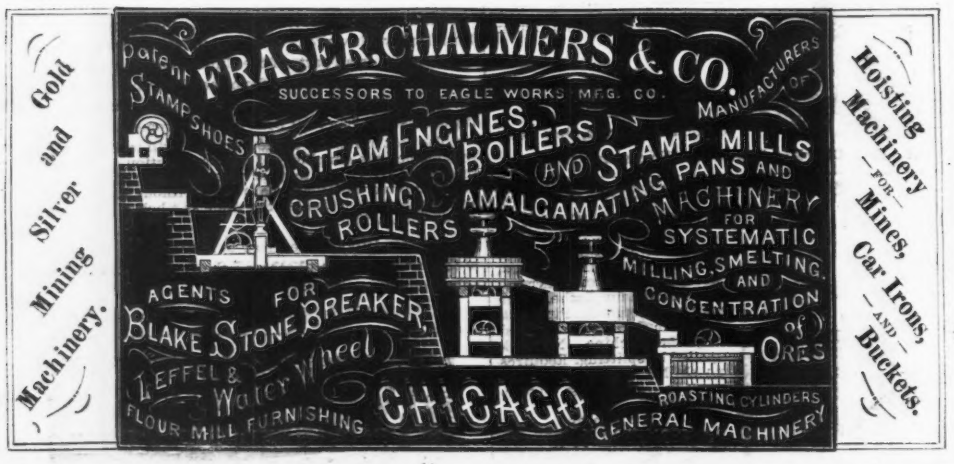
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Extract from report of Committee of Civ. Engs. appointed by Franklin Inst. to examine H. & B.'s new Transit [Dec. 1871]: "It exhibits several novelties of construction which, in the opinion of the committee, render it superior to those now in use, and in its opinion the deviations which they have made from the common styles of Transit are decided improvements."

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THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E.
ROSSITER W. RAYMOND, Ph. D. } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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Meeting of the Gas Light Association.

ON the 20th inst., the American Gas Light Association held its Annual Meeting in this city.

The enormous interests involved in the manufacture of lighting gas, as affecting both the stockholders in our gas light companies and that larger and more important class, the gas consumers, have placed the subject of gas making among those calling for thorough scientific, as well as practical, knowledge. There are few engineers who will not readily admit that the art of making illuminating gas is, to-day, in a crude and, to a great extent, unsatisfactory condition. The plant required is enormously expensive, and the results obtained by no means exhaust the hidden capabilities of the materials used, while the question is far from settled that these are the most advantageous ones at our disposal. We recognize the full importance of *practical success* as the necessary preliminaries to the adoption of any new process, but there should evidently also be a spirit of inquiry which would lead strong companies to make the necessary experiments to test the value of promising inventions; otherwise no improvement would ever be introduced.

Our managers of gas works and, indeed, those of every country, are, as a class, very conservative, some of them even to such a degree that they seem to fear and discountenance any innovation on the old-time processes of years ago. Some appear to avoid all discussion of the question of the reduction in the cost of gas, as though it might imperil the large capital invested in their works and draw too close attention to their enormous profits, or to their lack of enterprise or knowledge. The discussions of the Gas Light Association will certainly do much to clear away these antiquated fears, for there will always be so large a number of progressive engineers and managers in that body as to secure for all measures promising improvement in gas manufacture a fair and impartial consideration.

The meeting, which has just taken place, has been, probably, the most successful yet held by this young association. The attendance was very large, some 70 members, representing all parts of the country from Maine to California, and from Canada to Florida, having been present.

The following gentlemen were elected officers for the coming year:

President, Gen. CHAS. ROOME, New York.
Vice-Presidents, W. H. PRICE, Cleveland, Ohio.
GEO. B. NEAL, Boston, Mass.
OLIVER G. STEELE, Buffalo, Y. Y.
J. L. SMITH.
Sec. and Treasurer, CHAS. NETTLETON, New York.

FINANCE COMMITTEE :

JOHN S. CHAMBERS, Trenton. | GEO. A. MCILHENNY, Washington.
J. P. HARBISON, Hartford.

EXECUTIVE COMMITTEE :

W. H. DENNISTON, Pittsburgh. | HENRY CARTWRIGHT, Philadelphia.
T. LITTLEHALES, Hamilton, Ont. | WM. H. WHITE, Brooklyn.
A. HICKENLOOPER, Cincinnati, | HENRY STACEY, Indianapolis.

The following new members were elected :

ALEX. C. HUMPHREYS, Bergen, Pa.
JAMES H. SMITH, Newark, Ohio.
AUGUSTUS L. ALLEN, Poughkeepsie, N. Y.
C. F. SMITH, Marlboro, Md.
CHARLES COLLIER, Selma, Alabama.
GEORGE BRUISH, Halifax, N S.
JAMES SOMMERVILLE, Knoxville, Tenn.
LEWIS MOSS, Sandusky, Ohio.
EDWARD L. WOOD, Lewiston, Me.
R. J. MONKS, Boston, Mass.
EDWARD JONES, Boston, Mass.
J. W. NEWELL, New Brunswick, N. J.
WM. F. WARNER, Waverly, N. Y.
S. L. MACY, Greenfield, Mass.
WM. D. CADWELL, Nashua, N. H.
WM. HUMPHREY, Waterford, Mass.
F. J. DAVIS, Waltham, Mass.
W. E. WAITE, Brattleboro, Vt.
D. H. CRAFTS, N. Hampton, Mass.
GIDEON WOOD, New Bedford Mass.
W. F. B. DURFEE, Fall River, Mass.
JAMES SLINGLUFF, Norristown.
D. H. FOX, Reading.
ROBERT YOUNG, Alleghany City.
GEO. W. EDGE, Jersey City.

The high professional standing of the gentlemen in whose hands the management of the Association has been placed, gives promise of its greatly extended usefulness.

The proprietors of the ENGINEERING AND MINING JOURNAL regret not being able to lay before their readers in this number a full report of this very interesting meeting. They desired to do so, and had arranged for a full stenographic report, made exclusively for this paper, but were informed that, by a singular decision of the officers of the Association, no special report would be allowed, and we have been obliged to join with our valued and courteous contemporary, the *Gas-Light Journal*, in reporting the meeting, and are, consequently, unable to publish any extended notice of it till next week. We refrain, at present, from any criticism of this policy or its cause, hoping that it may be so modified as to place us in a position to give the gas fraternity at large early and full information of all the proceedings of the Association, as well as of other subjects of interest to gas engineers and gas consumers.

Experimental Iron Making in Canada.

OUR Northern Cousins are ambitious. They want to make iron like other people; and why not? They have abundance of excellent iron ore in many different parts of the Dominion, so abundant, indeed, that they send some of it over here to us, and take it back worked up into axes and ploughs, locomotives, bank safes, and so forth. They have limestone in immediate proximity to the iron ores everywhere, and abundance of wood for fuel; and they have, in many localities, the advantage of water transportation—as long as it lasts—for in that hyperborean region everything is frozen up six months (more or less) in the year. Wages, too, till very recently, were much lower there than here, for the Canadians, with an obstinacy that they have inherited from their forefathers, still cling to what some of our progressive politicians call "that relic of barbarism," a hard currency, and have utterly rejected our admirable inconvertible rag money. Of late, it is true, the great depression in business here has so brought down wages, that they are now quite as low at our ore mines as at those in Canada. Yet, with what seems, from an outside standpoint, advantages, even greater than we have, for the cheap production of charcoal iron, our neighbors have never developed this industry. Nor can this be attributed to lack of enterprise, for our Arctic neighbors are both ingenious, enterprising and practical. The reasons undoubtedly are, that Canada is a large country, sparsely populated, and with but little superfluous capital, so that, getting their iron from this country and England with but very light duties, there was little inducement for taking the capital from other and more urgent, if not more profitable, enterprises, to put it in the establishment of iron works. Yet, several crude attempts have been made to manufacture iron there, but with the boldness that is born of ignorance and lack of experience, our ambitious cousins have almost always sought to inaugurate their iron business by making "a revolution in iron metallurgy."

At Marmora, some years ago, a small furnace was built to make iron by some improved Chenot-direct-reduction-process, and what between total ignorance of the business, fast managers, who kept fast horses and other fast things, the capital was reduced more rapidly than the ore, and the manufacture of iron in that part of the country received a check from which twelve years have not revived it. During the past year, attention has again been quite generally directed to this subject, and with the same ignorant ambition. We find the first move to erect iron works comes in the shape of some untried patent process, that is to make iron for $3 50 per ton. With curious, and, we fear, with prophetic appropriateness, this new experiment is to be tried at Marmora, where so much money has been already volatilized in patent furnaces. The Belleville *Ontario*, of about a month ago, says :

"A gentleman who visited Marmora on Friday and Saturday informs us that on Friday the experiment of smelting iron ore with petroleum was tried on a small scale, but unsuccessfully, the bottom of the cupola being burnt out by the too great heat. On Saturday the experiment is said to have succeeded admirably. A quantity of iron was smelted, and a portion of it taken to the blacksmith's shop, where, after two heats, it was got to work satisfactorily. The process is said to be a secret, which is jealously guarded by its possessors, who claim that by its use iron can be raised and smelted at $3 50 per ton. We are informed that they are so well satisfied with the result of Saturday's experiment, that they intend repairing the old works and proceeding on a large scale."

And in the Toronto *Globe*, of the 9th inst., we find the following note, which, we suppose, refers to the same thing :

"A meeting of the leading citizens was held last night in the Council Chamber respecting the new method of smelting iron by crude oil instead of by coal. The new process is the invention of an English firm who have introduced it into Canada, and lately made experiments with it at Coburg with marked success. It is proposed to erect a smelting works here at a cost of $75,000, and use the fluid fuel, the right, or royalty, being paid the patentees, by their holding its value in stock in the enterprise."

It would appear from this that these enterprising Canadians are still bent on revolutionizing the iron manufacture, and are going to sink their money in some untried device that, however "simple" and "ingenious" it may be, will, without doubt, come to success, if it ever do arrive there, only by the long road of tedious and costly experiments. Was there ever a more simple device imagined than that of converting cast-iron into steel by simply blowing air through it? Yet, it required many years of experiments, and involved the expenditure of enormous amounts of money, before the Bessemer process became a success. And though we wish our cousins well in their enterprise, and will be gratified should we be able to record their success in making iron direct from the ore with petroleum fuel, yet we cannot refrain from saying that experiments of this kind are better undertaken by strong and experienced works, where the modifications that inevitably have to be made can be done without endangering the credit or existence of the concern—while in the establishment of an industry in a new country, with *very* limited capital, none but a thoroughly proven practical process should be adopted. A failure which, in the ordinary course of human events, seems highly probable in this case, would, doubtless,

set back now, as it did before, the establishment of iron works in that country for many years to come.

Let these ambitious iromasters moderate their zeal, and instead of seeking to make iron at the absurd price of $3 50 per ton, let them adopt such a design as that of the Bay Furnace, Lake Superior Region, described in the ENGINEERING AND MINING JOURNAL of September 18th, and get such a manager as Mr. H. S. PICKANDS, who will, if everything works well, be able to make their iron for, say, $18 per ton. The margin for profit on this figure should satisfy them, and there would be a patriotic satisfaction in being the first to establish this profitable industry; but in building "ideal" works to make iron by a kind of patent-Keely-Motor-process, for $3 50 a ton, we fear the only satisfaction which awaits the investors will be in having made a $75,000 monument to warn future generations from following in their footsteps.

The Labor Question in the Anthracite Regions.

THE accumulation of anthracite coal at the chief stocking places may be estimated as follows :

The Reading Company, at Port Richmond	175,000
The D. L. & W. R.R. Co., at Hoboken	10,000
The Delaware & Hudson Canal Co., at Rondout	80,000
Sundry companies, at Trenton and South Amboy	13,000
The Lehigh & Wilkes-Barre Coal Co., at Elizabethport & Port Johnston	20,000
The L. V. R. R. Co., at Perth Amboy	25,000
The Reading Company, at Williamsburg	13,000
	336,000

In addition to the above amounts it is reported that some of the companies have large supplies in their yards at various points, and considerable coal on the market in canal boats.

This large quantity has accumulated in about three and a half months' work, the market having been quite bare at the beginning of July. The amount of coal mined from the 1st of July to the 16th of October was no less than 8,750,000 tons, and it will be remembered that work was not fairly resumed until the middle of July. This quantity would represent an annual output of 30,000,000 tons, while the demand of the country at the present time is not more than at the rate of, say, 20,000,000 tons per annum, and from the present outlook it is scarcely probable that the market next year will take more than one and a half to two million tons more than in the present year. It is, therefore, quite evident that the present working capacity of our anthracite mines is fully one-third in excess of the requirements of the trade, and as it is cheaper to work a mine to its full capacity, while it is at work, and then let it stand idle, than to work half or two-thirds time all through the year, it is natural to suppose the companies will do this.

But how does it stand with the men? They must earn sufficient during the six months' work to support them during the year; or, in other words, they could afford to labor at steady work for but little over one-half the rate they nominally receive now. It is true, the pay-rolls of the mines show that miners, cutting coal on contract, have been making very high wages during the past four months, though working under the reduction against which the long strike was made. It has now, however, been decided by the Combination companies to work three-quarter time next month, and the prospect is, that even this proportion must be reduced in a few months more. The miners' wages for the year will then be insufficient to supply their wants, and we will have again the familiar, though totally erroneous, statements, that the miners are paid starvation wages. We have many times pointed out that the immediate cause of the miners' trouble is in the fact, that there are too many of them to do the work, and there are too many, only, because wages have been, and are now, much higher in the anthracite region than anywhere else, or in any other occupation in the country; this, naturally, attracts men from all other occupations, who do not sufficiently take into account the time they must stand idle, and that their total earnings actually average less than in many of the occupations they have left. There seems to be a prospect of a further reduction of wages in January; and so long as there is a superabundance of labor these reductions will continue to be made, and each year the men will be less able to offer any opposition, till, finally, many of them will be literally starved out of the region, and when the general revival of trade will have increased the demand for coal, the remainder will find steady work. We believe the manner in which the Miners' Unions can best promote the interests of their members, will be by sending a large number of them out of the region to the mines of the West and Southwest.

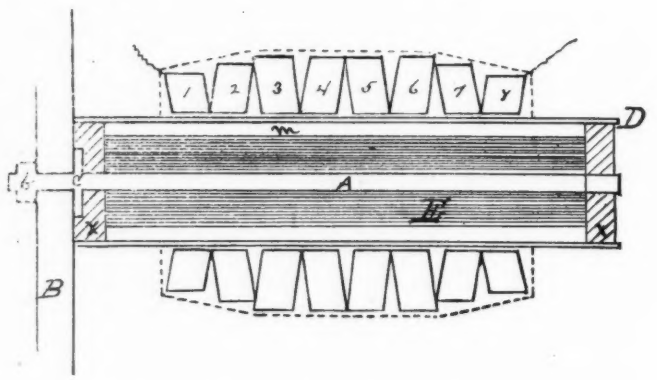
We last week published a call from the Tracy City (Tenn.) coal mines, for 50 miners, and we doubt not, if efforts were made, a good many could find more profitable employment at even $1 25 to $1 50 a day, in other parts of the country, than they now have while earning their $3 to $5 per day when working in the anthracite mines.

A Novel Induction Coil.

THE writer has recently designed and constructed a small Induction Coil, which presents some novel and interesting features. Its chief points of peculiarity consist in the arrangement of the "secondary wire," and the manner in which it is insulated. This wire is of copper the two-hundredth part of an inch in diameter, and is used *without covering of any kind.*

The insulating materials used are hard rubber, paraffin, and paper saturated with melted wax.

The construction of the coil will be readily understood after inspecting the accompanying diagram which represents a longitudinal section through its axis, one fourth actual dimensions.



The coil stands in the vertical position on the base of the instrument, and is so maintained by means of a three-eights inch iron rod A., which is provided with a collar c, and a nut b, by which device the rod is firmly fastened to the base board B. This rod forms the axis of the coil. Around this axis is placed the "core" E, consisting of about twelve hundred iron wires No. 20 wire gauge, made perfectly straight, and very carefully annealed. The core is ten and a half inches long, one and seven-eights inches in diameter, and is covered with four layers of thick paper saturated with melted paraffin. Next comes the "primary wire" which occupies the space m. This wire is of copper one-eleventh inch in diameter, and ninety feet in length. It is wound in two layers which are separated by six thicknesses of paraffin paper. This amount of insulating material between the layers was found to be necessary in order to prevent a discharge of induced electricity between the ends of the wire. The primary wire is not covered wire, but is wound with a narrow strip of paper between the consecutive turns. The object of this is to economize space, and to get on as great a length of wire as possible.

Outside the primary wire is placed the hard rubber tube D, which is twelve inches long, two and a half inches internal diameter, and one-eight inch thick. It is held firmly in position by the pieces x, x, which are of wood, and which also support the bundle of wires E.

The "secondary wire," which is thirty thousand feet in length, is wound in eight sections, and covers eight inches of the rubber tube as shown. Sections 1 and 8 contain thirty-five layers of wire each ; 2 and 7 contain fifty-five layers each, and sections 3, 4, 5 and 6 sixty-seven layers each. This arrangement places most wire around the middle portion of the core E, where its inductive force is greatest. The consecutive layers of wire in each section are insulated from each other by means of two thicknesses of unsized paper saturated with melted wax ; and the consecutive turns of wire in each layer are insulated from each other by being wound with a space of the two hundredth part of an inch between them. Wax, instead of parafin, is used to saturate the paper between the layers of wire, because, owing to its adhesive properties, it retains the fine wire in position. The course of the wire through the several sections is as follows : Commencing with section 1, it passes round and forms the outside layer first ; thence from layer lo layer until the innermost one is reached. There it crosses over to section 2, where sections one and two touch each other, and forms the innermost layer of section 2 ; thence from layer to layer until the outside one is reached ; then it passes to section 3, forming the outside layer first, and so on until it finally ends in the outside layer of section 8.

Of course, the initial direction of the wire round the coil is preserved through all the sections. It will be noticed the sections are so built up that, while the outer or inner edges of two adjacent ones touch where the wire passes from one to the other, the opposite edges are a considerable distance (three-eighths of an inch) apart.

The wedge-shaped space thus formed is filled with melted paraffin, which forms the insulation between the sections.

The advantage of this arrangement, as regards economy of space, is obvious. No insulating material being required between the sections where the wire passes from one to the other, none is used. But as the quantity of wire, and consequently the tension of the induced electricity, increases directly as the distance from this point toward the opposite edges of any two contiguous sections, so the thickness of paraffin increases until finally it is thickest of all where insulation is most needed. A space of the eighth of an inch between the innermost layer of the sections and the tube D is filled with melted paraffin, which, together with the rubber tube itself, forms the insulation between the primary and secondary wires.

All of the sections are finally covered with melted paraffin applied by means of a brush until the coil assumes the shape indicated by the dotted lines. The ends of the secondary wire are carried to hard rubber posts six inches high and the same distance apart.

The object in using the secondary wire *bare* is economy of space. It is a matter of the greatest importance that the whole of the secondary wire be placed as near as possible to the magnetic core E, as the inductive force of the latter varies inversely as the square of the distance from its axis.

The same amount of silk-covered wire would occupy at least double the space, and would, consequently, average much farther away from the core.

The "condenser" used with this coil consists of two hundred and forty sheets of tinfoil, five by ten inches, arranged in the usual manner, and separated by single sheets of varnished paper. The "break-piece" is Foucault's automatic, in which the rupture of the current occurs at the surface of mercury covered by a layer of absolute alcohol. It is operated by a separate electro-magnete, which, however, is in connection with the primary wire of the coil. The instrument is provided with a communicator by which the primary current is started, stopped, or reversed at pleasure.

The performance of this coil is quite extraordinary for an instrument of such small size. When operated with two cells of Bunsen's battery, it gives sparks three and a half inches in length, and with *one* large cell of the "Grenet" battery three inch sparks are obtained. The sparks are very dense, and are attended with numerous and brilliant ramifications.

Cleveland, O. C. F. BRUSH, M. E.

On the Danger of Using a Certain Kind of Water for Feeding Land Boilers.

Communicated by M. JOSEPH FARCOT to the Society of Civil Engineers, France ; and translated for the ENGINEERING AND MINING JOURNAL by Chief Engineer B. F. ISHERWOOD, U. S. Navy.

IN June, 1866, the Messrs. FARCOT erected at Pont-Remy a tubular boiler with 1,722 square feet of heating surface, similar in design to many others, but of different dimensions. When steam was raised, nothing occurred to raise apprehension ; some leaks appeared in the crown of the furnace, but no great attention was paid to them, and, after tightening a number of rivets, the boiler was used uninterruptedly for more than two months. At that time, near the 15th of September, large leaks suddenly started in all the upper seams of the furnace, the latter being circular in cross section. These seams were re-riveted with much labor, the work requiring fifteen days, after which steam was raised and the boiler used for three days. On the fourth day new leaks, identical with the first ones, appeared, and new repairs occupying about fifteen days were made. Steam being again raised, the same leaks re-appeared after twenty-four hours, but much more aggravated. This state of things was repeated seven times in six months.

The Messrs. FARCOT and the engineers of the "Société Linière" (for which the boiler was constructed) made every effort to discover the cause of these undefined and identical accidents. They altered the furnace, changing its form entirely and renewing its material ; they likewise modified the number and aggregate cross section of the tubes, making radical changes and using new metal for the plates, tubes and rivets, but all in vain. At the end of the trials, the Messrs. FARCOT concluded that the cause of the evil was in the nature of the feed water. In fact, from the beginning of the accidents, a thick froth which easily solidified had been observed in the glass water-gauge ; and upon all the furnace crown was found an impalpable grey powder apparently calcined there, as though these plates had not been covered with water. This powder, which was whiter in other parts of the boiler, having been collected and mixed with clean water in a bucket, the mixture presented the strange phenomenon of not wetting either the hand or the bucket. Later, these gentlemen recollected that during the first weeks of regular use, they had introduced daily, as a precaution, into the boiler a considerable quantity of carbonate of soda ; and that the successive accidents occurred only after the discontinuance of this carbonate. Also, that the leaks which started during the days immediately following the first raising of steam, occurred before the use of that alkaline salt. The Messrs. FARCOT communicated these facts to the Society of Pont-Remy, which answered, and with every appearance of reason, that the accidents could not be caused by the water, because it was the same which had been used for many years to feed the boilers of the factory. These gentlemen, although the rejection of their boiler was decided on, obtained, by urgent application, permission to make a last repair and a last trial purely in the interest f science, for which purpose they temporarily *changed the feed water.*

After starting under this new condition, there were no more accidents, and the boiler worked perfectly to the entire satisfaction of the "Société Linière" of Pont-Remy.

At the time the Messrs. FARCOT obtained permission to make a last experiment, they had read in the March number of the "Technologiste" for 1867, a striking account of recent accidents absolutely identical with those of Pont-Remy, and found in it a lucid explanation and complete demonstration of all which had happened in their case. The Messrs. FARCOT give a summary of the facts in that journal, taken from a memoir by M. WEBER, published at Berlin and reproduced in the "Technologiste."

At a forge situated in Upper Silesia and belonging to M. BORSIG, there were erected, for supplying steam to two blowing engines of 150 horse-power each, six boilers 50 inches in diameter with interior flues and connected by vertical pipes with six lower boilers 36 inches in diameter. The feed water was drawn from a neighboring coal mine and delivered into a tank, which also received the water blown from the cylinders and the water of condensation of the exhaust steam.

At the conclusion of a preliminary trial of the engines during fourteen days, the regular service of the smelting furnace was commenced and shortly afterwards leaks were observed in the seams of each boiler, which, although causing no apprehension at first, rapidly increased, and soon becoming so great that none of the six boilers would hold water, the engines and furnace had to be stopped. On examining the interior of the boilers, there was found a residue of evaporation in the state of dry powder on the sides, and in the state of mud on the bottom, consisting of a bright grey substance, soft and argillaceous ; it was unctuous in the muddy state, but when dry it would not mix with either cold or hot water but floated on the surface.

In the interior of the boilers, great injuries were observed ; the memoir gives a frightful list, plate by plate. There were fractures over an extent of 15, 17, 24 or 27 rivets ; and a considerable separation of the plates which were twisted, cracked, torn, etc., by overheating. The boilers were thus suddenly thrown out of use and nearly destroyed. All this damage happened to the six at once, without any external indication that could have caused suspicion; but an inspection of the plates revealed an evident overheating notwithstanding the absolute certainty that the water had never been below the proper level.

In order to discover the mysterious cause of this overheating, investigation was made in different directions both by experiment and by simple practice, the result of which was a contradiction of all the hypotheses hitherto formed of the cause of these colossal injuries. Thus, both the feed-water and the residue of evaporation had been analysed (as had been also done by the Messrs. FARCOT in the case of their boiler at Pont-Remy) without the detection of any substance offering the least connection with the observed facts or to which they might be attributed ; and in this direction success was considered but little probable, as the same water had been used during many years for feeding other boilers which had sustained no injury. This, too, was exactly the same reasoning opposed in the case of the boiler at Pont-Remy. Experiments were made on the tensile strength of the metal of the boiler plates, which being found 56,890 pounds per square inch of section, their injury could not be attributed to their want of quality. Changes were made in the flues but without result.

As the use of the smelting furnace could no longer be dispensed with, it was finally decided to replace the injured boilers by three new ones with lower connecting boilers of the simple and primitive type that had long been employed at the mine with the same feed-water and without injury.

When the new boilers were ready, those of the preceding ones that had been repaired were simultaneously put in operation. After about fourteen days, during which the latter were fired with much care and observed with great attention to ascertain their evaporative power, new leaks appeared and became so great in a little time as to render their use impossible. Unfortunately, the results with the new boilers were not much better. At the end of forty-eight hours steaming, the effect of unequal heating or of overheating the plates manifested itself by leaks, and by the following remarkable phenomenon : the shell of the boiler, 47½ feet long, resting on the cast iron front of the furnace, expanded 2 inches vertically above that front, and contracted sensibly whenever the furnace door remained open during the charging of the grate with fresh coal ; this dilitation and contraction occurred with such rapidity that it was momentarily visible to the eye. No modification of the grates, flues, or manner of supporting the new boilers, effected any improvement, and without doubt they would have been destroyed had not an external phenomenon indicated the cause of the evil.

Very soon after the commencement of a fresh trial to test the manner in which the new boilers were embedded in the masonry, a dull sound was heard followed by violent jerking of the boilers as though they were on the point of exploding. The fire was then hastily drawn. The observation of this phenomenon led to the conjecture that, by some cause or other, the water in the boilers had been deprived of the power to wet the plates, for there was an absolute certainty that its level had always been sufficiently high.

The attention of the engineers was also attracted at this time to two notes, one by M. SCHMIDT, a civil engineer at Vienna, and the other by Dr. BOLLEY, both of which described cases were feed-water containing fatty matter from condensing engines had caused the destruction of the boilers. An examination was then made of the fatty matter in the residue of evaporation from the three new boilers, which was similar to that from the preceding ones. The nature of this residue was ascertained, and also the fact that the feed-water in the iron tank contained fatty matter brought by the water blown out of the clyinders and by the water of condensation of the exhaust steam.

After these discoveries, the remedy was no longer doubtful. The tank, the boilers and the feed-pipes were washed, to free them from all fatty matter; and neither the water blown out of the cylinders, nor that produced by the condensation of the exhaust steam, was longer delivered into the tank. To the feed-water thus purified, a little soda was added to saponify whatever fatty matter might have escaped the washing. After this preparation the new boilers were put in operation, and from that time no injuries like those described have ever appeared. The service was assured, and the employment of soda was found useless after the boilers and feed-water were kept free from fatty matter.

There still remains to be ascertained how the fatty matter was able to produce such extensive destruction. The analyses of the deposit forming the residue of evaporation during the first use of the injured new boilers gave a quantity of fatty matter, varying from 3½ to 5½ per centum; and as principal element the carbonate of lime with a great deal less quantity of carbonate of magnesia; consequently, it was an insoluble calcareous soap, or fatty salt of lime and magnesia, resulting from combinations of these bases with a fatty acid. The Messrs. FARCOT had the water of Pont-Remy analysed at the Imperial School of Mines; it gave about 0.33 per centum of solid matter, and the composition of the residue of evaporation, collected from the boiler, was analogous to the composition of that collected from the new Silesian boilers. The principal element is the carbonate of lime which combined with the fatty matter due to an excessive lubrication of the cylinders, and brought over from them in the waters of condensacation, formed the fat calcareous salt that was the cause of all the mischief. In fact, at Pont-Remy the feed-pump took the water from the reservoir into which the water of condensation was delivered.

The German engineers made some direct experiments to ascertain the manner in which the fatty matter had acted on the new boilers of M. BORSIG. They heated water to the boiling-point, in an iron capsule whose surface, to resemble the inner surface of a boiler, was not entirely clean metal, and then poured in some oil, which was quickly carried by the violent water currents against different parts of the capsule, when it was clearly seen that the parts of the metal covered by the adherent oil, transmitted heat very badly, and became overheated. They also ascertained that the effect of an incrustation of the surface by a fatty salt of lime is still more pernicious than that of a deposit of the merely fatty matter ; that such an incrustation adheres with greater tenacity to the surface than the fatty matter itself ; and that it transmits heat very slowly.

A very simple experiment shows the manner in which the fat calcareous salt acts in boilers. Heat some water to the boiling-point in a capsule of iron, whose inner surface is not quite clean iron, then pour a little oil on the water, and add a little powdered lime, when a fat calcareous salt will form, and portions of it be driven, by the ebullition, against the sides of the capsule, to the clean parts of which, and near the water-level, they will principally adhere. Gently heating the edge of the capsule at the water-level, increases the precipitation. The mass of the substance deposits later in similar incrustations, one upon another, over the entire surface of the capsule. A deposit of this kind of fat calcareous salt, containing a little free fat, is but very imperfectly wetted by water. Such a deposit in the capsule being no longer wetted, the edges of the water appear, under certain circumstances, to take a convex form.

With a knowledge of these facts, the disastrous influence of this fat calcareous salt can easily be understood. Its interposition prevents the boiler-surfaces from contact with the water, and, not being wetted itself, the heat applied to those surfaces accumulates in them to their destruction. Hence, to it alone is to be attributed the overheating of the plates, their deformation and fracture, and the shearing of their rivets, in the cases cited. The German engineers even thought that, under certain conditions, the explosion of boilers might be caused by this salt.

The Société Linière of Pont-Remy, instructed as to its true interest, and enlightened as to the nature of the facts, by the results of the last experiments and by the history of the new Silesian boilers, retains its tubular boiler as one of their best. It is used regularly, and fed with calcareous water, but free of fatty matter.

The series of accidents and difficulties, which so long annoyed the Messrs. FARCOT, occasioned them a loss of from 1800 to 2000 dollars. The loss of the German engineers of the Silesian establishment is not known, but they are estimated to have spent from 12,000 to 14,000 dollars.

In conclusion, the Messrs. FARCOT show that it was the fat calcareous salt in their boiler at Pont-Remy which, in the same manner as in the new boilers of M. BORSIG, in Silesia, prevented its plates from becoming wetted, and caused its destruction in 48 hours. That was the enemy, hidden or unknown until this moment, whose existence the Messrs. FARCOT believe they should publish, persuaded that it has been previously, and under other circumstances, the cause of unmerited disaster to many builders and engineers.

The formation of this salt is always to be feared when the feed-water is obtained from calcareous ground, and is mixed with fatty matter ; nor is it necessary that the water should be very highly charged with the mineral salts, since the water of Pont-Remy contained only 0·33 per centum of solid residue, which

is the same proportion as in the water of the Seine, according to the chemical treatise of Messrs. PÉLOUZE and FRÉMY.

The Messrs. FARCOT believe that, according to the analyses of the residues of evaporation from the Silesian boilers and the boiler of Pont-Remy, the formation of the fat calcareous salt in presence of fatty matter takes place especially when the ordinary residues of evaporation contain from 80 to 90 per centum of the carbonates of lime and magnesia, as such is the particular chemical characteristic of the natural deposits from fresh water in boilers.

Machinery for Making India Rubber Goods.

By WM. E. KELLY, New Brunswick, N. J.

ABOUT the year 1820, the first pair of India-rubber shoes was imported into the United States; they were brought from South America, and were made of pure India-rubber, or, more properly, Caoutchouc, and were very thick, heavy, and clumsy. They were found very useful in protecting the feet from dampness, and the importation rapidly increased. Experiment proved that they could be manufactured in the United States by importing the raw material, which led to the manufacture of the numberless articles now made from India-rubber.

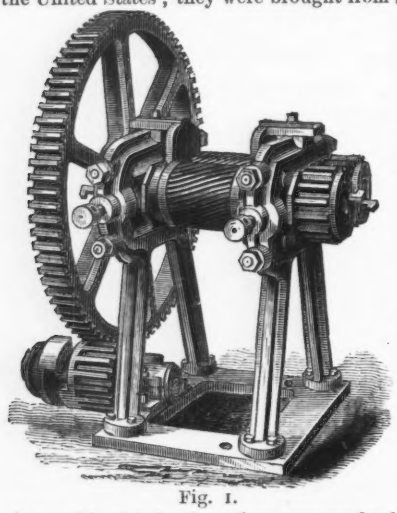


Fig. 1.

The first rubber shoes were made in South America by the natives, and were formed on wooden or clay lasts, which were dipped in the sap collected from the Caoutchouc trees. They were then held over a smoking fire and thus dried, and when the coating became sufficiently hard the process was repeated until the necessary thickness was obtained; the lasts were then taken out, and the shoes hung up in the sun and thoroughly dried, when they were ready for shipment.

This crude process was gradually improved upon by the introduction of ingenious machinery, and now the manufacture of rubber shoes and similar articles is about as follows: The gum, as it arrives in this country, contains a large amount of impurities, and the first process in a factory is to pass it a number of times through the gum washer or masticator, (see Fig. 1.) This machine consists of two corrugated or ground rolls, with the necessary gearing. These rolls tear or pull the piece of gum from its first form to that of a long narrow sheet, full of irregular incisions. This allows the water, which is made to flow over the gum on its passage through the rolls, to thoroughly wash and clean it. The sheeting of the gum allows it to be more readily dried.

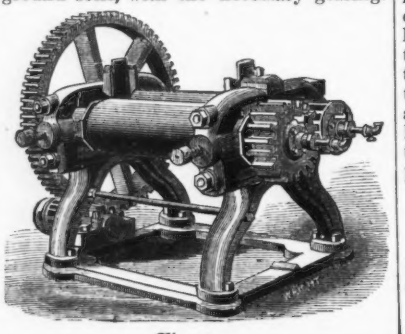


Fig. 2.

After thus drying it is taken to the grinding, or mill-room, in which are a number of machines called grinding mills (Fig. 2). In these grinding mills is placed a certain quantity of rubber gum, together with various other compounds, which vary with the kind of goods desired to be produced. The mass is then passed through the mill a number of times, and thoroughly mixed; it is then taken to a machine called a calender, and either spread in sheets or on cloth. In Fig. 3 we show one

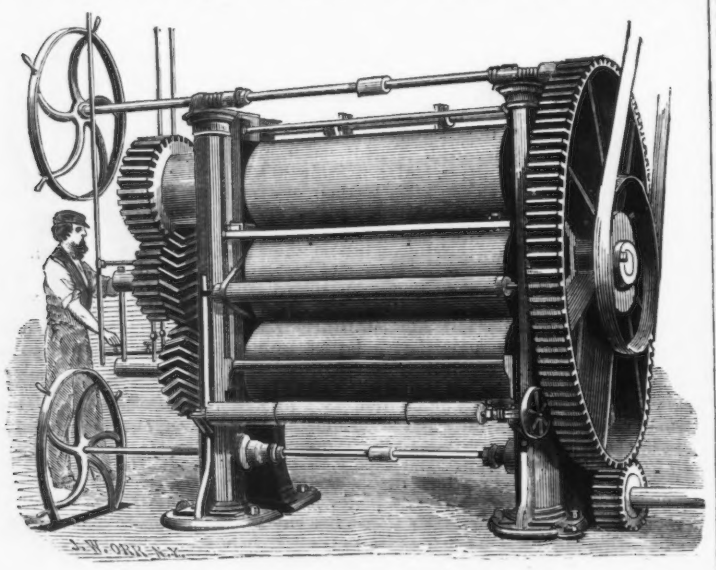


Fig. 3.

composed of three rolls; sometimes they are made with four or five rolls. One having four rolls 20 inches in diameter, and 62 inches long on the face, is a large, heavy machine, weighing from 60,000 to 70,000 pounds, but they are so made that they can be regulated to vary the thickness of the gum to the thousandth part of an inch.

In order to secure perfect smoothness in the goods, the calender should be fitted with the spiral connecting gears. With the ordinary gearing there is more or less "back lash," which leaves marks on the goods, being very objectionable in fine goods; with the spiral gear this is avoided, (see Fig. 4).

Fig. 4.

The sheets from the calender are cut into clothing, boots, shoes, etc., and after being properly made up and varnished, the cloth is taken to the vulcanizing heater, and there cured. This is the finishing operation.

In the above we have give a sketch of the principal machines used in a rubber factory. Of course numerous special machines are also required.

Gallium—A New Metal.

GALLIUM is the name given, "in honor of France," to a new element which has been discovered by M. LECOQ, an amateur *savant*, of Bois-Baudran, Cognac. The celebrated chemist, WURTZ, presented to the Académie des Sciences, in its sitting of September 20th, a note on the part of M. LECOQ, announcing the discovery, particulars of which had been communicated under seal as far back as August 27th. This new element has not yet been isolated, and has not therefore been seen by any one; its physical characteristics remain so far unknown. It is an analogue of zinc and cadmium, of which metals it is an alloy, and was found in a blende from Pietrafita, Spain. The forms under which it is known, so far, are those of the chloride and sulphate. The discoverer is a student of the phenomena of the spectroscope, and it was in the course of his observations that the new metal presented itself, its character being revealed by a spectrum which no simple body had ever given. Two lines, one much brighter than the other, both situated in the violet—the region occupied by the brightest lines of the zinc—were noticed, the place of the former line being at the 417th degree of the scale of lines, and the other at the 404th. The affinities which gallium has with zinc are declared by chemical analysis as well as by its spectrum. Like zinc it is not thrown down from solution in hydrochloric acid by sulphuretted hydrogen; and preserves its analogy with zinc by being precipitated by the same gas from an acetic acid solution. Under these conditions it is obtained before the zinc, and on fractionation, the two are got separately. Like zinc, the new metal gives a white precipitate with the sulphide of ammonium. On immersing a piece of zinc in a solution of the new metal it separates and comes out, not in a metallic form, but under that of an oxide, precisely as aluminium does under similar circumstances. The analogy with aluminium, however, is not long sustained, for if a small dose of ammonia precipitates the gallium, an excesses dissolves it. Up to the present time, only a very small quantity of gallium has been obtained, but M. WURTZ, who presented the paper, has given the Academy tubes of solution for experiment; and on asking for a commission to examine into the question and to place gallium on the list of simple bodies, the Academy named M. WURTZ, himself, joining with him M. FRÉMY. The actual number of known elements is 63, 47 of which are metals and 16 metalloids. If the new element takes the place claimed for it, France will have obtained an honor equal to that of England which discovered thallium, and approximative to that of Germany, the discoverer of casium and rubidium.

Some Foreign Street-Loss Accounts for 1874.

THE following figures and facts, which are furnished to the *Gas Light Journal* by J. R. SMEDBERG, of San Francisco, compiled from the London *Gas Journal*, are all from official returns:

I. *London Companies.*	Street Loss.
Ratcliff	5¼ per cent.
Phœnix	6¾ "
Crystal Palace District	7½ "
Imperial	7½ "
South Metropolitan	8 "
Chartered	9 "
Commercial	10½ "
London	12 "
Average of 8 London Co's	8⅜ "
Maximum	12 "
Minimum	5½ "
II. *Companies outside of London.*	
Birmingham	5 "
Portsea	5 "
Bath	5½ "
Leeds	5½ per cent.
Galashiels	7½ "
Bombay	9¼ "
Berlin	10 "
Shanghai	10 "
Halifax	11 "
Worthing	11 "
Singapore	12 "
Carmarthen	14 "
Cagliari	14 "
Barton	14 "
Alliance (of Dublin)	19 "
Glasgow (Corporation)	19 "
Average of 16 outside Companies	10¾ "
Maximum	19 "
Minimum	5 "

The above returns are not selected, but embrace all that I have been able to find in the official reports published in the London *Gas Journal* for 1875 to date.

REMARKS.—The little Ratcliff, making only 300 millions per annum, and recently consolidated with the Commercial, shows but 5¼ per cent. street loss, although its mains surround the docks, and are therefore subject to vibration from the heaviest traffic. It sold over 9,400 feet out of the ton during 1874.

The Phœnix lost prior to districting over 30 per cent. It now loses 6¾ per cent., and increased its ton-sales, 1874 over 1873, by 200 cubic feet.

The Surrey Consumers' (London) increased its ton-sales, 1874 over 1873, by 800 cubic feet.

The Imperial sells 9,000 cubic feet out of the ton.

The Chartered makes 12½ millions per day during the winter, at its Beckton station alone. It has, practically, *no* leakage on its leading 48-inch main from Beckton to Notting Hill. It sells over 9,000 feet out of the ton. It increased its ton-sales, 1874 over 1873, by nearly 800 feet; and has reduced its street loss, first from 23 to 16 per cent., and, finally, from 16 to 9 per cent.

The Portsea Island gas works reduced its street loss from 11 per cent., in 1869, to 5 per cent., in 1874; its total make for 1874 being 256 millions.

The Leeds company has reduced its loss from 24 per cent. down to 5¼ per cent.

At Shanghai the loss was 13½ per cent. in 1873, and 9¾ per cent. in 1874.

At Carmarthen some of the mains are fifty-two years old. (!!!)

METHVEN, (London *Journal of Gas-Lighting*, Feb. 24, 1874) referring to a small

gas works, says that the reduction of leakage is a very expensive as well as difficult operation. Five and a-half miles, varying from eight inches to two inches were examined and repaired; the work occupying eight weeks, and costing about £50 per mile. The leakage before the repair of the mains was 450 cubic feet per hour, and after the repair it was 85 cubic feet per hour; the pressure in each case being 23 tenths.

The same writer gives (London *Gas-Light Journal*, March 24, 1874) the case of a gas works, where the leakage was reduced, during seven years' attention, from 29 to 16 per cent., by the use of lamp governors, the overhauling of the mains, and the examination of services and fittings outside the meters. The street loss per mile per annum was 240,000 cubic feet.

D. A. GRAHAM (London *Gas-Light Journal*, April 14, 1874) thus gives what he calls "*an excellent receipt for running a gas company.*—Purchase what are termed cheap coals, spend as little as possible on the repairs of retorts, and do not trouble yourself about leaky mains or services."

SHADROCH STUDHOLME (London *Gas-Light Journal*, August 18, 1874) after endorsing METHVEN, says: "I could give instances where, with a four-inch pressure, we have reduced a leakage of from 30 to 50 feet per hour to from 3 to 5 feet per hour, per 100 yards of mains."

He proposes stripping the main in sections, and testing each section separately by a proving gas-holder and test meter, adding that "it is a kind of work which requires time, patience, perseverance and money; but money so spent is well laid out, and will soon repay itself."

The Construction of Gasworks.*

BY HARRY EDWARD JONES, Assoc. Inst. C. E.

CONTINUED FROM PAGE 380.

MR. G. T. LIVESEY considered that the paper presented a complete summary of gas manufacture. With regard to the question of stage houses and houses on the ground floor, he had hitherto always worked with the latter, and he was bound to say that his preference was for the old-fashioned method. But in erecting new houses he should adopt the former plan, because some mechanical form of stoking might be introduced, for which the stage house would prove more suitable. He had tried the mode of fastening the slates both by strong copper and by lead wires, and had given it up long ago, for the sulphurous acid fumes corroded both the copper and the lead. Nothing answered so well as laths of angle iron fitted in with a deal batten 1½ inch square, to which the slates were nailed. For preventing the accumulation of pitch in the hydraulic main, he could not approve of the plan of lengthening the ascension pipe, since it did not accord with the remarks in the paper as to cheapness in cost of construction and efficiency in action. The method might be thoroughly efficient in action, but it certainly was not the cheapest in cost of construction. The plan of placing in the old-fashioned main a false bottom, or constructing new mains with a shallow bottom, so that there was no space in which the tar could lodge, was effective, there not being the least viscidity in the tar. He thoroughly agreed with the author as to the expediency of reducing the temperature in the condenser. It must be lowered somewhere, and it was better that this should be where it could be controlled, than in the streets and in the fittings of houses. He believed the difficulty of insuring the successful action of the scrubber, as commonly arranged, might be overcome by a suitable arrangement of BARKER'S mill, by which a small quantity of water might be so distributed through the mass of the scrubber as effectually to remove the ammonia, at any rate so far that the gas issuing from it should not stain turmeric paper. That had been his experience for some years, and he was satisfied when such a result was obtained. He had found it a good plan to bring the gas in at the top of the purifier, so that it should work downwards. In ordinary working, the first purifier on being changed became the last; then, if the gas worked upwards, its last contact would be with the foul cover of the purifier; if it worked downwards, its last contact would be with the bottom of the purifier. Sufficient purifying material fell through to cover the bottom, and so to prevent the gas from having contact with surfaces impregnated with foul gas. He agreed in thinking that the top of an untrussed gasholder should not be quite flat. It had been the practice in holders with untrussed crowns to make the top nearly flat; but when the crown was trussed there was a considerable rise. In a gasholder of 150 feet in diameter the sheeting would rise 7 feet 6 inches; whereas, if the gasholder had been constructed without internal trussing, the sheeting would probably only be allowed to rise 2 feet 6 inches. Being engaged in the construction of a gasholder on that plan, of 180 feet in diameter and 45 feet deep, without internal framing, he made some simple experiments to ascertain the relative strain on the curb in proportion to the rise of the crown. He found that, supposing with a 3-feet rise there would be on a certain section of the sheeting attached to the curb, say, a strain of 3 tons, if the rise were 9 feet, the strain would be proportionately reduced, and would be only 1 ton. Puddle, for gasholder tanks, was in his experience a most intolerable nuisance, and exceedingly treacherous. As a lining to a canal, where it was undisturbed for years, nothing could be better, but it was far different in gasworks, where it might be necessary to build one gasholder tank one year and to build another near it after the lapse of only four or five years. In solid blue clay there would be no difficulty, but if the ground was treacherous, and there was much running sand or gravel, in pumping the water for the excavation of the new tank the puddle of the adjoing tank would probably be loosened. As he had found, from time to time, that on constructing a new tank the old ones began to leak, he was now constructing a tank entirely of concrete, without a particle of puddle, and he trusted to make the interior sound by rendering it with Portland cement. He had thus far every reason to hope that the experiment would be successful. He decidedly approved of the throttle-valve governor used by the author. With reference to the introductory and the concluding remarks of the author, as to high efficiency and low expenditure, he was afraid the law, as regarded London gas companies, rendered it difficult for gas engineers to do right, if the dictum was, as would be generally admitted, a correct one. The present system offered no inducement to the engineer to cheapen gas. It offered every encouragement to do the best he could for the company in regard to substantiality of work, but when it was the interest of shareholders to get as much money invested as they could, with 10 per cent. practically guaranteed, it would be easily seen that by economizing capital the engineers might not please his masters.

MR. HODGSON JONES said that the steam stoker appeared to him to promise something better than had yet been seen. In the Glasgow Gasworks, Mr. FOULIS, M. Inst. C.E., used an hydraulic stoker, which was acting very fairly; and the same plan had been adopted in Manchester; so that he hoped, sooner or later, some good mechanical means of stoking would be obtained. This would not do away with the necessity of a covered yard-space. In most of the metropolitan works, and elsewhere in England, the covered yard-space was inadequate for proper working. The coals were at times obliged to be exposed; and it was well known that the use of wet coals produced from 10 to 15 per cent. deterioration, and coke, by exposure to wet, was deteriorated to the extent of 15 per cent. The use of wet coals also led to the production of an increased quantity of bisulphide of carbon and carbonic acid. Dr. LETHEBY deprecated a higher temperature than a cherry red or a full bright red, anything beyond that breaking up the hydrocarbons in the tar, and he blamed the London managers for working at too high heats. But with good Newcastle coal, Mr. H. JONES had found that the best results were obtained by a bright orange, or nearly white heat, 2,200° to 2,300° Fahr. The settings would last for about three working years. He employed D retorts 18 inches by 13 inches, by 20 feet long. A bench of seven would carbonize, in twenty-four hours, 8 tons 8 cwt. of coal, giving 5 tons 17 cwt., or 70 per cent., of coke, and producing from 10,200 to 10,300 cubic feet of gas of 13 to 14 candle power with 18 per cent. to 20 per cent. of fuel, using six-hour charges. With that heat, he believed some of the light oils in the tar were decomposed. The anthracine obtained from the tar was a valuable product. Dr. LETHEBY had made a useful proposal that the exhauster should be placed before the condenser. He quite agreed with the reasons assigned, and should be anxious to try the method. Hitherto the position of the exhauster had generally been after the scrubbers or after the condenser. In many works he had moved the exhauster from beyond the scrubbers to immediately after the condenser. The reason, he thought, why this plan had not been adopted was the difficulty of dealing with the high temperature of 100°, and with so much tar in the gas to pump. The author recommended rotary exhausters. Mr. H. JONES had used many of these, and had also employed reciprocating exhausters; the result of his experience was that with the latter there was a saving of from 50 per cent. to 60 per cent. upon the former; he alluded especially to wear and tear, and to the consumption of fuel. With suitable designs, and a properly-placed hydraulic main, there should be no stoppages in the ascension pipes. He was connected with many works in which there was no trouble of that kind, and if such a thing occurred, the insertion of a grating at the mouth of the retort reduced the temperature and removed the obstruction. He thought that stoppages in the hydraulic main arose entirely from neglect. Gas engineers agreed that the temperature of the gas should be controllable. He unhesitatingly said that condensers should be put under cover, as also the scrubbers and the purifiers; it was impossible to keep uniform temperatures when the vessels were exposed to the variations of the seasons. The scrubbers he used were different from any of those mentioned. They were three in number, and were filled with thin boards, on the system adopted by Mr. LIVESAY at the South Metropolitan Gasworks, exposing a large surface and proving very effective. He washed the gas in large volumes in the first and second scrubbers. Instead of a Barker's mill, which distributed only a small quantity of liquor, he had two entries for it, through which large quantities were discharged, like heavy rain. The result was that he could concentrate the liquor up to about 20 ounces. The strength was not generally so high as that, because the liquor was usually treated at the works; but where it was sent away, it was concentrated to about 20 ounces without difficulty. He finished by cleaning the gas with pure water. The effect of drenching the gas with liquor was to break up the bisulphide of carbon and to enable the gas to be much more easily purified. Lime varied so much in different parts of the country, and was so offensive after being used for purification, that managers were often in great difficulty as to how to dispose of it. In some works he used the lime first for the purpose of removing the carbonic acid gas, and he afterwards got rid of the sulphuretted hydrogen by an oxide. He preferred LAMING'S system for preparing the oxide, because by it some of the carbonate of lime was turned into sulphite, and that assisted in freeing the gas from carbonic acid that might otherwise pass. The oxide could be treated in two ways—by manual labor, or by sending a blast of air through it by means of steam. He had adopted the latter system in one case, the result being that the purifiers were kept 4 months in action, the steam being employed for 4 hours out of every 72 hours. When the material was done with, it was worked over again, until it had absorbed all the sulphur that it would take up. He had gradually reduced the number of sieves to only one, putting the lime on thicker; and he found no disadvantage from back pressure. The superficial area at the top of a purifier was, he thought, the right indication of its power of purifying, and not the bulk of material got into it on a series of tiers of sieves. Fifteen years ago he was connected with the late Mr. GEORGE LOWE in some works, and they then tried a good many gasholders made without framing; but no great economy was effected; and he had long discontinued their use. There was not much saving in the first cost; there must be a certain pressure to force the gas through the mains, and in the case of medium-sized gasholders without framing, so as to be economically constructed, there was not a sufficient weight of metal to give the necessary pressure. In a large gasholder, with a strong curb and heavy plates, he could understand no framing being used, but with holders up to 150 feet in diameter he should certainly always put in framing. The description of material for building a tank would depend much upon locality. In many places he should hesitate to adopt concrete for building a gasholder tank, although he had done so in other constructions for water tanks. The governor, as generally used, was an exceedingly delicate and a correct instrument, not necessitating such additions as a throttle valve. The Ratcliff was a small district, with heavy lighting on the whole of it, and 6 per cent. unaccounted-for gas was certainly under the average. He considered 10 per cent. to be a fair average. In London, the public lighting was not equal to that in most other towns. As there was a limitation of 1 inch pressure up to twelve o'clock, and after that only ½ inch, that might partly account for the small loss stated. For the consumers a sufficient and equal pressure, and uniform quality of gas, were as desirable as cheapness. He thought that recent legislation, requiring gas of high illuminating power, was a mistake. In the act of 1860, gas with an illuminating power of 12 candles was named, and since that period this had been raised to 16 candles. The reason why engineers were obliged to use cannel coal with the Newcastle coal, was not the high heats employed, but the necessity of furnishing gas of that illuminating power, as it could scarcely ever be got out of the best Newcastle coal, with a fair yield of gas per ton. If the standard were reduced to 13 or 14 candles, he believed the gas would be more uniform in quality, and the public would certainly have the benefit of a reduced price. The burner generally employed in London, the union jet, was not a suitable one, as it allowed a great deal of gas to pass off unconsumed. He had lately observed, in his own room, where there was a six-light chandelier, a close and offensive smell. By employing one of SUGG'S London burners, the Argand burner, the atmosphere of the room was at once rendered pleasant, and a greater amount of light was given. The late Mr. NEILSON was the inventor of

*A paper read before the Institution of Civil Engineers of London, JANUARY 12, 1875.

set back now, as it did before, the establishment of iron works in that country for many years to come.

Let these ambitious iromasters moderate their zeal, and instead of seeking to make iron at the absurd price of $3 50 per ton, let them adopt such a design as that of the Bay Furnace, Lake Superior Region, described in the ENGINEERING AND MINING JOURNAL of September 18th, and get such a manager as Mr. H. S. PICKANDS, who will, if everything works well, be able to make their iron for, say, $18 per ton. The margin for profit on this figure should satisfy them, and there would be a patriotic satisfaction in being the first to establish this profitable industry; but in building "ideal" works to make iron by a kind of patent-Keely-Motor-process, for $3 50 a ton, we fear the only satisfaction which awaits the investors will be in having made a $75,000 monument to warn future generations from following in their footsteps.

The Labor Question in the Anthracite Regions.

THE accumulation of anthracite coal at the chief stocking places may be estimated as follows:

The Reading Company, at Port Richmond	175,000
The D. L. & W. R.R. Co., at Hoboken	10,000
The Delaware & Hudson Canal Co., at Rondout	80,000
Sundry companies, at Trenton and South Amboy	13,000
The Lehigh & Wilkes-Barre Coal Co., at Elizabethport & Port Johnston	20,000
The L. V. R. R. Co., at Perth Amboy	25,000
The Reading Company, at Williamsburg	13,000
	336,000

In addition to the above amounts it is reported that some of the companies have large supplies in their yards at various points, and considerable coal on the market in canal boats.

This large quantity has accumulated in about three and a half months' work, the market having been quite bare at the beginning of July. The amount of coal mined from the 1st of July to the 16th of October was no less than 8,750,000 tons, and it will be remembered that work was not fairly resumed until the middle of July. This quantity would represent an annual output of 30,000,000 tons, while the demand of the country at the present time is not more than at the rate of, say, 20,000,000 tons per annum, and from the present outlook it is scarcely probable that the market next year will take more than one and a half to two million tons more than in the present year. It is, therefore, quite evident that the present working capacity of our anthracite mines is fully one-third in excess of the requirements of the trade, and as it is cheaper to work a mine to its full capacity, while it is at work, and then let it stand idle, than to work half or two-thirds time all through the year, it is natural to suppose the companies will do this.

But how does it stand with the men? They must earn sufficient during the six months' work to support them during the year; or, in other words, they could afford to labor at steady work for but little over one-half the rate they nominally receive now. It is true, the pay-rolls of the mines show that miners, cutting coal on contract, have been making very high wages during the past four months, though working under the reduction against which the long strike was made. It has now, however, been decided by the Combination companies to work three-quarter time next month, and the prospect is, that even this proportion must be reduced in a few months more. The miners' wages for the year will then be insufficient to supply their wants, and we will have again the familiar, though totally erroneous, statements, that the miners are paid starvation wages. We have many times pointed out that the immediate cause of the miners' trouble is in the fact, that there are too many of them to do the work, and there are too many, only, because wages have been, and are now, much higher in the anthracite region than anywhere else, or in any other occupation in the country; this, naturally, attracts men from all other occupations, who do not sufficiently take into account the time they must stand idle, and that their total earnings actually average less than in many of the occupations they have left. There seems to be a prospect of a further reduction of wages in January; and so long as there is a superabundance of labor these reductions will continue to be made, and each year the men will be less able to offer any opposition, till, finally, many of them will be literally starved out of the region, and when the general revival of trade will have increased the demand for coal, the remainder will find steady work. We believe the manner in which the Miners' Unions can best promote the interests of their members, will be by sending a large number of them out of the region to the mines of the West and Southwest.

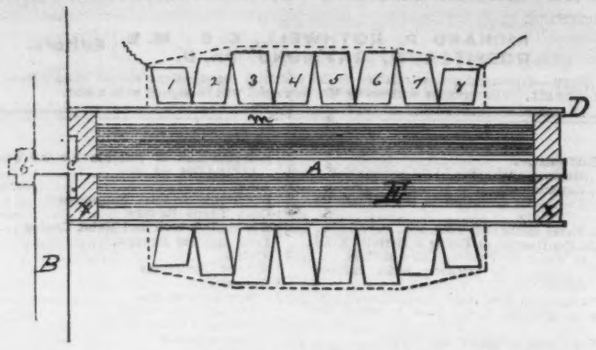
We last week published a call from the Tracy City (Tenn.) coal mines, for 50 miners, and we doubt not, if efforts were made, a good many could find more profitable employment at even $1 25 to $1 50 a day, in other parts of the country, than they now have while earning their $3 to $5 per day when working in the anthracite mines.

A Novel Induction Coil.

THE writer has recently designed and constructed a small Induction Coil, which presents some novel and interesting features. Its chief points of peculiarity consist in the arrangement of the "secondary wire," and the manner in which it is insulated. This wire is of copper the two-hundredth part of an inch in diameter, and is used *without covering of any kind.*

The insulating materials used are hard rubber, paraffin, and paper saturated with melted wax.

The construction of the coil will be readily understood after inspecting the accompanying diagram which represents a longitudinal section through its axis, one fourth actual dimensions.



The coil stands in the vertical position on the base of the instrument, and is so maintained by means of a three-eights inch iron rod A., which is provided with a collar c, and a nut b, by which device the rod is firmly fastened to the base board B. This rod forms the axis of the coil. Around this axis is placed the "core" E, consisting of about twelve hundred iron wires No. 20 wire gauge, made perfectly straight, and very carefully annealed. The core is ten and a half inches long, one and seven-eights inches in diameter, and is covered with four layers of thick paper saturated with melted paraffin. Next comes the "primary wire" which occupies the space m. This wire is of copper one-eleventh inch in diameter, and ninety feet in length. It is wound in two layers which are separated by six thicknesses of paraffin paper. This amount of insulating material between the layers was found to be necessary in order to prevent a discharge of induced electricity between the ends of the wire. The primary wire is not covered wire, but is wound with a narrow strip of paper between the consecutive turns. The object of this is to economize space, and to get on as great a length of wire as possible.

Outside the primary wire is placed the hard rubber tube D, which is twelve inches long, two and a half inches internal diameter, and one-eight inch thick. It is held firmly in position by the pieces x, x, which are of wood, and which also support the bundle of wires E.

The "secondary wire," which is thirty thousand feet in length, is wound in eight sections, and covers eight inches of the rubber tube as shown. Sections 1 and 8 contain thirty-five layers of wire each; 2 and 7 contain fifty-five layers each, and sections 3, 4, 5 and 6 sixty-seven layers each. This arrangement places most wire around the middle portion of the core E, where its inductive force is greatest. The consecutive layers of wire in each section are insulated from each other by means of two thicknesses of unsized paper saturated with melted wax; and the consecutive turns of wire in each layer are insulated from each other by being wound with a space of the two hundredth part of an inch between them. Wax, instead of parafin, is used to saturate the paper between the layers of wire, because, owing to its adhesive properties, it retains the fine wire in position. The course of the wire through the several sections is as follows: Commencing with section 1, it passes round and forms the outside layer first; thence from layer lo layer until the innermost one is reached. There it crosses over to section 2, where sections one and two touch each other, and forms the innermost layer of section 2; thence from layer to layer until the outside one is reached; then it passes to section 3, forming the outside layer first, and so on until it finally ends in the outside layer of section 8.

Of course, the initial direction of the wire round the coil is preserved through all the sections. It will be noticed the sections are so built up that, while the outer or inner edges of two adjacent ones touch where the wire passes from one to the other, the opposite edges are a considerable distance (three-eighths of an inch) apart.

The wedge-shaped space thus formed is filled with melted paraffin, which forms the insulation between the sections.

The advantage of this arrangement, as regards economy of space, is obvious. No insulating material being required between the sections where the wire passes from one to the other, none is used. But as the quantity of wire, and consequently the tension of the induced electricity, increases directly as the distance from this point toward the opposite edges of any two contiguous sections, so the thickness of paraffin increases until finally it is thickest of all where insulation is most needed. A space of the eighth of an inch between the innermost layer of the sections and the tube D is filled with melted paraffin, which, together with the rubber tube itself, forms the insulation between the primary and secondary wires.

All of the sections are finally covered with melted paraffin applied by means of a brush until the coil assumes the shape indicated by the dotted lines. The ends of the secondary wire are carried to hard rubber posts six inches high and the same distance apart.

The object in using the secondary wire *bare* is economy of space. It is a matter of the greatest importance that the whole of the secondary wire be placed as near as possible to the magnetic core E, as the inductive force of the latter varies inversely as the square of the distance from its axis.

The same amount of silk-covered wire would occupy at least double the space, and would, consequently, average much farther away from the core.

The "condenser" used with this coil consists of two hundred and forty sheets of tinfoil, five by ten inches, arranged in the usual manner, and separated by single sheets of varnished paper. The "break-piece" is Foucault's automatic, in which the rupture of the current occurs at the surface of mercury covered by a layer of absolute alcohol. It is operated by a separate electro-magnete, which, however, is in connection with the primary wire of the coil. The instrument is provided with a communicator by which the primary current is started, stopped, or reversed at pleasure.

The performance of this coil is quite extraordinary for an instrument of such small size. When operated with two cells of Bunsen's battery, it gives sparks three and a half inches in length, and with *one* large cell of the "Grenet" battery three inch sparks are obtained. The sparks are very dense, and are attended with numerous and brilliant ramifications.

Cleveland, O. C. F. BRUSH, M. E.

On the Danger of Using a Certain Kind of Water for Feeding Land Boilers.

Communicated by M. Joseph Farcot to the Society of Civil Engineers, France; and translated for the Engineering and Mining Journal by Chief Engineer B. F. Isherwood, U. S. Navy.

In June, 1866, the Messrs. Farcot erected at Pont-Remy a tubular boiler with 1,722 square feet of heating surface, similar in design to many others, but of different dimensions. When steam was raised, nothing occurred to raise apprehension; some leaks appeared in the crown of the furnace, but no great attention was paid to them, and, after tightening a number of rivets, the boiler was used uninterruptedly for more than two months. At that time, near the 15th of September, large leaks suddenly started in all the upper seams of the furnace, the latter being circular in cross section. These seams were re-riveted with much labor, the work requiring fifteen days, after which steam was raised and the boiler used for three days. On the fourth day new leaks, identical with the first ones, appeared, and new repairs occupying about fifteen days were made. Steam being again raised, the same leaks re-appeared after twenty-four hours, but much more aggravated. This state of things was repeated seven times in six months.

The Messrs. Farcot and the engineers of the "Société Linière" (for which the boiler was constructed) made every effort to discover the cause of these undefined and identical accidents. They altered the furnace, changing its form entirely and renewing its material; they likewise modified the number and aggregate cross section of the tubes, making radical changes and using new metal for the plates, tubes and rivets, but all in vain. At the end of the trials, the Messrs. Farcot concluded that the cause of the evil was in the nature of the feed water. In fact, from the beginning of the accidents, a thick froth which easily solidified had been observed in the glass water-gauge; and upon all the furnace crown was found an impalpable grey powder apparently calcined there, as though these plates had not been covered with water. This powder, which was whiter in other parts of the boiler, having been collected and mixed with clean water in a bucket, the mixture presented the strange phenomenon of not wetting either the hand or the bucket. Later, these gentlemen recollected that during the first weeks of regular use, they had introduced daily, as a precaution, into the boiler a considerable quantity of carbonate of soda; and that the successive accidents occurred only after the discontinuance of this carbonate. Also, that the leaks which started during the days immediately following the first raising of steam, occurred before the use of that alkaline salt. The Messrs. Farcot communicated these facts to the Society of Pont-Remy, which answered, and with every appearance of reason, that the accidents could not be caused by the water, because it was the same which had been used for many years to feed the boilers of the factory. These gentlemen, although the rejection of their boiler was decided on, obtained, by urgent application, permission to make a last repair and a last trial purely in the interest f science, for which purpose they temporarily *changed the feed water.*

After starting under this new condition, there were no more accidents, and the boiler worked perfectly to the entire satisfaction of the "Société Linière" of Pont-Remy.

At the time the Messrs. Farcot obtained permission to make a last experiment, they had read in the March number of the "Technologiste" for 1867, a striking account of recent accidents absolutely identical with those of Pont-Remy, and found in it a lucid explanation and complete demonstration of all which had happened in their case. The Messrs. Farcot give a summary of the facts in that journal, taken from a memoir by M. Weber, published at Berlin and reproduced in the "Technologiste."

At a forge situated in Upper Silesia and belonging to M. Borsig, there were erected, for supplying steam to two blowing engines of 150 horse-power each, six boilers 50 inches in diameter with interior flues and connected by vertical pipes with six lower boilers 36 inches in diameter. The feed water was drawn from a neighboring coal mine and delivered into a tank, which also received the water blown from the cylinders and the water of condensation of the exhaust steam.

At the conclusion of a preliminary trial of the engines during fourteen days, the regular service of the smelting furnace was commenced and shortly afterwards leaks were observed in the seams of each boiler, which, although causing no apprehension at first, rapidly increased, and soon becoming so great that none of the six boilers would hold water, the engines and furnace had to be stopped. On examining the interior of the boilers, there was found a residue of evaporation in the state of dry powder on the sides, and in the state of mud on the bottom, consisting of a bright grey substance, soft and argillaceous; it was unctuous in the muddy state, but when dry it would not mix with either cold or hot water but floated on the surface.

In the interior of the boilers, great injuries were observed; the memoir gives a frightful list, plate by plate. There were fractures over an extent of 15, 17, 24 or 27 rivets; and a considerable separation of the plates which were twisted, cracked, torn, etc., by overheating. The boilers were thus suddenly thrown out of use and nearly destroyed. All this damage happened to the six at once, without any external indication that could have caused suspicion; but an inspection of the plates revealed an evident overheating notwithstanding the absolute certainty that the water had never been below the proper level.

In order to discover the mysterious cause of this overheating, investigation was made in different directions both by experiment and by simple practice, the result of which was a contradiction of all the hypotheses hitherto formed of the cause of these colossal injuries. Thus, both the feed-water and the residue of evaporation had been analysed (as had been also done by the Messrs. Farcot in the case of their boiler at Pont-Remy) without the detection of any substance offering the least connection with the observed facts or to which they might be attributed; and in this direction success was considered but little probable, as the same water had been used during many years for feeding other boilers which had sustained no injury. This, too, was exactly the same reasoning opposed in the case of the boiler at Pont-Remy. Experiments were made on the tensile strength of the metal of the boiler plates, which being found 56,890 pounds per square inch of section, their injury could not be attributed to their want of quality. Changes were made in the flues but without result.

As the use of the smelting furnace could no longer be dispensed with, it was finally decided to replace the injured boilers by three new ones with lower connecting boilers of the simple and primitive type that had long been employed at the mine with the same feed-water and without injury.

When the new boilers were ready, those of the preceding ones that had been repaired were simultaneously put in operation. After about fourteen days, during which the latter were fired with much care and observed with great attention to ascertain their evaporative power, new leaks appeared and became so great in a little time as to render their use impossible. Unfortunately, the results with the new boilers were not much better. At the end of forty-eight hours steaming, the effect of unequal heating or of overheating the plates manifested itself by leaks, and by the following remarkable phenomenon: the shell of the boiler, 47½ feet long, resting on the cast iron front of the furnace, expanded 2 inches vertically above that front, and contracted sensibly whenever the furnace door remained open during the charging of the grate with fresh coal; this dilitation and contraction occurred with such rapidity that it was momentarily visible to the eye. No modification of the grates, flues, or manner of supporting the new boilers, effected any improvement, and without doubt they would have been destroyed had not an external phenomenon indicated the cause of the evil.

Very soon after the commencement of a fresh trial to test the manner in which the new boilers were embedded in the masonry, a dull sound was heard followed by violent jerking of the boilers as though they were on the point of exploding. The fire was then hastily drawn. The observation of this phenomenon led to the conjecture that, by some cause or other, the water in the boilers had been deprived of the power to wet the plates, for there was an absolute certainty that its level had always been sufficiently high.

The attention of the engineers was also attracted at this time to two notes, one by M. Schmidt, a civil engineer at Vienna, and the other by Dr. Bolley, both of which described cases were feed-water containing fatty matter from condensing engines had caused the destruction of the boilers. An examination was then made of the fatty matter in the residue of evaporation from the three new boilers, which was similar to that from the preceding ones. The nature of this residue was ascertained, and also the fact that the feed-water in the iron tank contained fatty matter brought by the water blown out of the clyinders and by the water of condensation of the exhaust steam.

After these discoveries, the remedy was no longer doubtful. The tank, the boilers and the feed-pipes were washed, to free them from all fatty matter; and neither the water blown out of the cylinders, nor that produced by the condensation of the exhaust steam, was longer delivered into the tank. To the feed-water thus purified, a little soda was added to saponify whatever fatty matter might have escaped the washing. After this preparation the new boilers were put in operation, and from that time no injuries like those described have ever appeared. The service was assured, and the employment of soda was found useless after the boilers and feed-water were kept free from fatty matter.

There still remains to be ascertained how the fatty matter was able to produce such extensive destruction. The analyses of the deposit forming the residue of evaporation during the first use of the injured new boilers gave a quantity of fatty matter, varying from 3½ to 5½ per centum; and as principal element the carbonate of lime with a great deal less quantity of carbonate of magnesia; consequently, it was an insoluble calcareous soap, or fatty salt of lime and magnesia, resulting from combinations of these bases with a fatty acid. The Messrs. Farcot had the water of Pont-Remy analysed at the Imperial School of Mines; it gave about 0.33 per centum of solid matter, and the composition of the residue of evaporation, collected from the boiler, was analogous to the composition of that collected from the new Silesian boilers. The principal element is the carbonate of lime which combined with the fatty matter due to an excessive lubrication of the cylinders, and brought over from them in the waters of condensacation, formed the fat calcareous salt that was the cause of all the mischief. In fact, at Pont-Remy the feed-pump took the water from the reservoir into which the water of condensation was delivered.

The German engineers made some direct experiments to ascertain the manner in which the fatty matter had acted on the new boilers of M. Borsig. They heated water to the boiling-point, in an iron capsule whose surface, to resemble the inner surface of a boiler, was not entirely clean metal, and then poured in some oil, which was quickly carried by the violent water currents against different parts of the capsule, when it was clearly seen that the parts of the metal covered by the adherent oil, transmitted heat very badly, and became overheated. They also ascertained that the effect of an incrustation of the surface by a fatty salt of lime is still more pernicious than that of a deposit of the merely fatty matter; that such an incrustation adheres with greater tenacity to the surface than the fatty matter itself; and that it transmits heat very slowly.

A very simple experiment shows the manner in which the fat calcareous salt acts in boilers. Heat some water to the boiling-point in a capsule of iron, whose inner surface is not quite clean iron, then pour a little oil on the water, and add a little powdered lime, when a fat calcareous salt will form, and portions of it be driven, by the ebullition, against the sides of the capsule, to the clean parts of which, and near the water-level, they will principally adhere. Gently heating the edge of the capsule at the water-level, increases the precipitation. The mass of the substance deposits later in similar incrustations, one upon another, over the entire surface of the capsule. A deposit of this kind of fat calcareous salt, containing a little free fat, is but very imperfectly wetted by water. Such a deposit in the capsule being no longer wetted, the edges of the water appear, under certain circumstances, to take a convex form.

With a knowledge of these facts, the disastrous influence of this fat calcareous salt can easily be understood. Its interposition prevents the boiler-surfaces from contact with the water, and, not being wetted itself, the heat applied to those surfaces accumulates in them to their destruction. Hence, to it alone is to be attributed the overheating of the plates, their deformation and fracture, and the shearing of their rivets, in the cases cited. The German engineers even thought that, under certain conditions, the explosion of boilers might be caused by this salt.

The Société Linière of Pont-Remy, instructed as to its true interest, and enlightened as to the nature of the facts, by the results of the last experiments and by the history of the new Silesian boilers, retains its tubular boiler as one of their best. It is used regularly, and fed with calcareous water, but free of fatty matter.

The series of accidents and difficulties, which so long annoyed the Messrs. Farcot, occasioned them a loss of from 1800 to 2000 dollars. The loss of the German engineers of the Silesian establishment is not known, but they are estimated to have spent from 12,000 to 14,000 dollars.

In conclusion, the Messrs. Farcot show that it was the fat calcareous salt in their boiler at Pont-Remy which, in the same manner as in the new boilers of M. Borsig, in Silesia, prevented its plates from becoming wetted, and caused its destruction in 48 hours. That was the enemy, hidden or unknown until this moment, whose existence the Messrs. Farcot believe they should publish, persuaded that it has been previously, and under other circumstances, the cause of unmerited disaster to many builders and engineers.

The formation of this salt is always to be feared when the feed-water is obtained from calcareous ground, and is mixed with fatty matter; nor is it necessary that the water should be very highly charged with the mineral salts, since the water of Pont-Remy contained only 0·33 per centum of solid residue, which

is the same proportion as in the water of the Seine, according to the chemical treatise of Messrs. PELOUZE and FREMY.

The Messrs. FARCOT believe that, according to the analyses of the residues of evaporation from the Silesian boilers and the boiler of Pont-Remy, the formation of the fat calcareous salt in presence of fatty matter takes place especially when the ordinary residues of evaporation contain from 80 to 90 per centum of the carbonates of lime and magnesia, as such is the particular chemical characteristic of the natural deposits from fresh water in boilers.

Machinery for Making India Rubber Goods.

By WM. E. KELLY, New Brunswick, N. J.

ABOUT the year 1820, the first pair of India-rubber shoes was imported into the United States; they were brought from South America, and were made of pure India-rubber, or, more properly, Caoutchouc, and were very thick, heavy, and clumsy. They were found very useful in protecting the feet from dampness, and the importation rapidly increased. Experiment proved that they could be manufactured in the United States by importing the raw material, which led to the manufacture of the numberless articles now made from India-rubber.

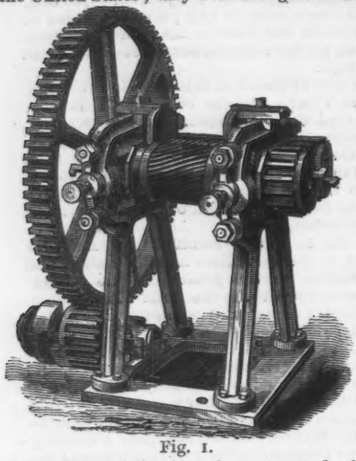


Fig. 1.

The first rubber shoes were made in South America by the natives, and were formed on wooden or clay lasts, which were dipped in the sap collected from the Caoutchouc trees. They were then held over a smoking fire and thus dried, and when the coating became sufficiently hard the process was repeated until the necessary thickness was obtained; the lasts were then taken out, and the shoes hung up in the sun and thoroughly dried, when they were ready for shipment.

This crude process was gradually improved upon by the introduction of ingenious machinery, and now the manufacture of rubber shoes and similar articles is about as follows: The gum, as it arrives in this country, contains a large amount of impurities, and the first process in a factory is to pass it a number of times through the gum washer or masticator, (see Fig. 1.) This machine consists of two corrugated or ground rolls, with the necessary gearing. These rolls tear or pull the piece of gum from its first form to that of a long narrow sheet, full of irregular incisions. This allows the water, which is made to flow over the gum on its passage through the rolls, to thoroughly wash and clean it. The sheeting of the gum allows it to be more readily dried.

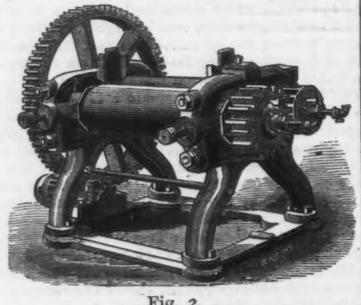


Fig. 2.

After thus drying it is taken to the grinding, or mill-room, in which are a number of machines called grinding mills (Fig. 2). In these grinding mills is placed a certain quantity of rubber gum, together with various other compounds, which vary with the kind of goods desired to be produced. The mass is then passed through the mill a number of times, and thoroughly mixed; it is then taken to a machine called a calender, and either spread in sheets or on cloth. In Fig. 3 we show one

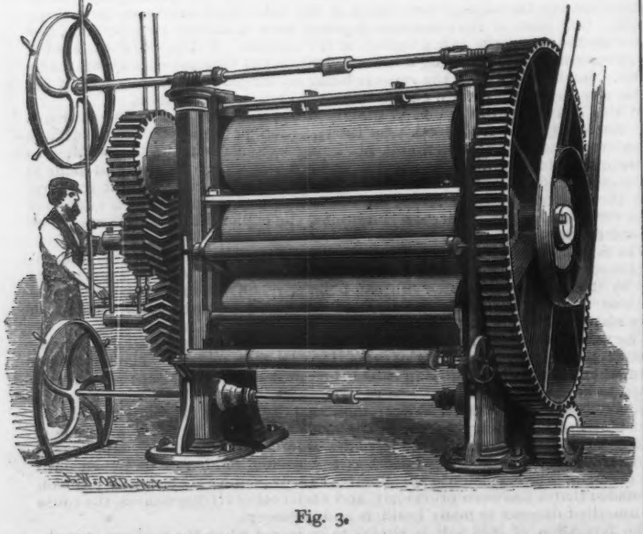


Fig. 3.

composed of three rolls; sometimes they are made with four or five rolls. One having four rolls 20 inches in diameter, and 62 inches long on the face, is a large, heavy machine, weighing from 60,000 to 70,000 pounds, but they are so made that they can be regulated to vary the thickness of the gum to the thousandth part of an inch.

In order to secure perfect smoothness in the goods, the calender should be fitted with the spiral connecting gears. With the ordinary gearing there is more or less "back lash," which leaves marks on the goods, being very objectionable in fine goods; with the spiral gear this is avoided, (see Fig. 4).

Fig. 4.

The sheets from the calender are cut into clothing, boots, shoes, etc., and after being properly made up and varnished, the cloth is taken to the vulcanizing heater, and there cured. This is the finishing operation.

In the above we have give a sketch of the principal machines used in a rubber factory. Of course numerous special machines are also required.

Gallium—A New Metal.

GALLIUM is the name given, "in honor of France," to a new element which has been discovered by M. LECOQ, an amateur *savant*, of Bois-Beaudran, Cognac. The celebrated chemist, WURTZ, presented to the Académie des Sciences, in its sitting of September 20th, a note on the part of M. LECOQ, announcing the discovery, particulars of which had been communicated under seal as far back as August 27th. This new element has not yet been isolated, and has not therefore been seen by any one; its physical characteristics remain so far unknown. It is an analogue of zinc and cadmium, of which metals it is an alloy, and was found in a blende from Pietrafita, Spain. The forms under which it is known so far, are those of the chloride and sulphate. The discoverer is a student of the phenomena of the spectroscope, and it was in the course of his observations that the new metal presented itself, its character being revealed by a spectrum which no simple body had ever given. Two lines, one much brighter than the other, both situated in the violet—the region occupied by the brightest lines of the zinc—were noticed, the place of the former line being at the 417th degree of the scale of lines, and the other at the 404th. The affinities which gallium has with zinc are declared by chemical analysis as well as by its spectrum. Like zinc it is not thrown down from solution in hydrochloric acid by sulphuretted hydrogen; and preserves its analogy with zinc by being precipitated by the same gas from an acetic acid solution. Under these conditions it is obtained before the zinc, and on fractionation, the two are got separately. Like zinc, the new metal gives a white precipitate with the sulphide of ammonium. On immersing a piece of zinc in a solution of the new metal it separates and comes out, not in a metallic form, but under that of an oxide, precisely as aluminium does under similar circumstances. The analogy with aluminium, however, is not long sustained, for if a small dose of ammonia precipitates the gallium, an excesses dissolves it. Up to the present time, only a very small quantity of gallium has been obtained, but M. WURTZ, who presented the paper, has given the Academy tubes of solution for experiment; and on asking for a commission to examine into the question and to place gallium on the list of simple bodies, the Academy named M. WURTZ, himself, joining with him M. FREMY. The actual number of known elements is 63, 47 of which are metals and 16 metalloids. If the new element takes the place claimed for it, France will have obtained an honor equal to that of England which discovered thallium, and approximative to that of Germany, the discoverer of casium and rubidium.

Some Foreign Street-Loss Accounts for 1874.

THE following figures and facts, which are furnished to the *Gas Light Journal* by J. R. SMEDBERG, of San Francisco, compiled from the London *Gas Journal*, are all from official returns:

I. *London Companies.*

	Street Loss.
Ratcliff	5¼ per cent.
Phœnix	6¾ "
Crystal Palace District	7¼ "
Imperial	7½ "
South Metropolitan	8 "
Chartered	9 "
Commercial	10½ "
London	12 "
Average of 8 London Co's	8¾ "
Maximum	12 "
Minimum	5½ "

II. *Companies outside of London.*

Birmingham	5 "
Portsea	5 "
Bath	5½ "
Leeds	5¼ per cent.
Galashiels	7½ "
Bombay	9¼ "
Berlin	10 "
Shanghai	10 "
Halifax	11 "
Worthing	11 "
Singapore	12 "
Carmarthen	14 "
Cagliari	14 "
Barton	14 "
Alliance (of Dub'in)	19 "
Glasgow (Corporation)	19 "
Average of 16 outside Companies	10¾ "
Maximum	19 "
Minimum	5 "

The above returns are not selected, but embrace all that I have been able to find in the official reports published in the London *Gas Journal* for 1875 to date.

REMARKS.—The little Ratcliff, making only 300 millions per annum, and recently consolidated with the Commercial, shows but 5¼ per cent. street loss, although its mains surround the docks, and are therefore subject to vibration from the heaviest traffic. It sold over 9,400 feet out of the ton during 1874.

The Phœnix lost prior to districting over 30 per cent. It now loses 6¾ per cent., and increased its ton-sales, 1874 over 1873, by 200 cubic feet.

The Surrey Consumers' (London) increased its ton-sales, 1874 over 1873, by 800 cubic feet.

The Imperial sells 9,000 cubic feet out of the ton.

The Chartered makes 12½ millions per day during the winter, at its Beckton station alone. It has, practically, *no* leakage on its leading 48-inch main from Beckton to Notting Hill. It sells over 9,000 feet out of the ton. It increased its ton-sales, 1874 over 1873, by nearly 800 feet; and has reduced its street loss, first from 23 to 16 per cent., and, finally, from 16 to 9 per cent.

The Portsea Island gas works reduced its street loss from 11 per cent., in 1869, to 5 per cent., in 1874; its total make for 1874 being 256 millions.

The Leeds company has reduced its loss from 24 per cent. down to 5¼ per cent.

At Shanghai the loss was 13¼ per cent. in 1873, and 9¼ per cent. in 1874.

At Carmarthen some of the mains are fifty-two years old. (!!!)

METHVEN, (London *Journal of Gas-Lighting*, Feb. 24, 1874) referring to a small

gas works, says that the reduction of leakage is a very expensive as well as difficult operation. Five and a-half miles, varying from eight inches to two inches were examined and repaired; the work occupying eight weeks, and costing about £50 per mile. The leakage before the repair of the mains was 450 cubic feet per hour, and after the repair it was 85 cubic feet per hour; the pressure in each case being 23 tenths.

The same writer gives (London *Gas-Light Journal*, March 24, 1874) the case of a gas works, where the leakage was reduced, during seven years' attention, from 29 to 16 per cent., by the use of lamp governors, the overhauling of the mains, and the examination of services and fittings outside the meters. The street loss per mile per annum was 240,000 cubic feet.

D. A. GRAHAM (London *Gas-Light Journal*, April 14, 1874) thus gives what he calls "*an excellent receipt for running a gas company.*—Purchase what are termed cheap coals, spend as little as possible on the repairs of retorts, and do not trouble yourself about leaky mains or services."

SHADBOCH STUDHOLME (London *Gas-Light Journal*, August 18, 1874) after endorsing METHVEN, says: "I could give instances where, with a four-inch pressure, we have reduced a leakage of from 30 to 50 feet per hour to from 3 to 5 feet per hour, per 100 yards of mains."

He proposes stripping the main in sections, and testing each section separately by a proving gas-holder and test meter, adding that "it is a kind of work which requires time, patience, perseverance and money; but money so spent is well laid out, and will soon repay itself."

The Construction of Gasworks.*

By HARRY EDWARD JONES, Assoc. Inst. C. E.

CONTINUED FROM PAGE 380.

MR. G. T. LIVESEY considered that the paper presented a complete summary of gas manufacture. With regard to the question of stage houses and houses on the ground floor, he had hitherto always worked with the latter, and he was bound to say that his preference was for the old-fashioned method. But in erecting new houses he should adopt the former plan, because some mechanical form of stoking might be introduced, for which the stage house would prove more suitable. He had tried the mode of fastening the slates both by strong copper and by lead wires, and had given it up long ago, for the sulphurous acid fumes corroded both the copper and the lead. Nothing answered so well as laths of angle iron fitted in with a deal batten 1½ inch square, to which the slates were nailed. For preventing the accumulation of pitch in the hydraulic main, he could not approve of the plan of lengthening the ascension pipe, since it did not accord with the remarks in the paper as to cheapness in cost of construction and efficiency in action. The method might be thoroughly efficient in action, but it certainly was not the cheapest in cost of construction. The plan of placing in the old-fashioned main a false bottom, or constructing new mains with a shallow bottom, so that there was no space in which the tar could lodge, was effective, there not being the least viscidity in the tar. He thoroughly agreed with the author as to the expediency of reducing the temperature in the condenser. It must be lowered somewhere, and it was better that this should be where it could be controlled, than in the streets and in the fittings of houses. He believed the difficulty of insuring the successful action of the scrubber, as commonly arranged, might be overcome by a suitable arrangement of BARKER'S mill, by which a small quantity of water might be so distributed through the mass of the scrubber as effectually to remove the ammonia, at any rate so far that the gas issuing from it should not stain turmeric paper. That had been his experience for some years, and he was satisfied when such a result was obtained. He had found it a good plan to bring the gas in at the top of the purifier, so that it should work downwards. In ordinary working, the first purifier on being changed became the last; then, if the gas worked upwards, its last contact would be with the foul cover of the purifier; if it worked downwards, its last contact would be with the bottom of the purifier. Sufficient purifying material fell through to cover the bottom, and so to prevent the gas from having contact with surfaces impregnated with foul gas. He agreed in thinking that the top of an untrussed gasholder should not be quite flat. It had been the practice in holders with untrussed crowns to make the top nearly flat; but when the crown was trussed there was a considerable rise. In a gasholder of 150 feet in diameter the sheeting would rise 7 feet 6 inches; whereas, if the gasholder had been constructed without internal trussing, the sheeting would probably only be allowed to rise 2 feet 6 inches. Being engaged in the construction of a gasholder on that plan, of 180 feet in diameter and 45 feet deep, without internal framing, he made some simple experiments to ascertain the relative strain on the curb in proportion to the rise of the crown. He found that, supposing with a 3-feet rise there would be on a certain section of the sheeting attached to the curb, say, a strain of 3 tons, if the rise were 9 feet, the strain would be proportionately reduced, and would be only 1 ton. Puddle, for gasholder tanks, was in his experience a most intolerable nuisance, and exceedingly treacherous. As a lining to a canal, where it was undisturbed for years, nothing could be better, but it was far different in gasworks, where it might be necessary to build one gasholder tank one year and to build another near it after the lapse of only four or five years. In solid blue clay there would be no difficulty, but if the ground was treacherous, and there was much running sand or gravel, in pumping the water for the excavation of the new tank the puddle of the adjoing tank would probably be loosened. As he had found, from time to time, that on constructing a new tank the old ones began to leak, he was now constructing a tank entirely of concrete, without a particle of puddle, and he trusted to make the interior sound by rendering it with Portland cement. He had thus far every reason to hope that the experiment would be successful. He decidedly approved of the throttle-valve governor used by the author. With reference to the introductory and the concluding remarks of the author, as to high efficiency and low expenditure, he was afraid the law, as regarded London gas companies, rendered it difficult for gas engineers to do right, if the dictum was, as would be generally admitted, a correct one. The present system offered no inducement to the engineer to cheapen gas. It offered every encouragement to do the best he could for the company in regard to substantiality of work, but when it was the interest of shareholders to get as much money invested as they could, with 10 per cent. practically guaranteed, it would be easily seen that by economizing capital the engineers might not please his masters.

Mr. HODGSON JONES said that the steam stoker appeared to him to promise something better than had yet been seen. In the Glasgow Gasworks, Mr. FOULIS, M. Inst. C.E., used an hydraulic stoker, which was acting very fairly; and the same plan had been adopted in Manchester; so that he hoped, sooner or later, some good mechanical means of stoking would be obtained. This would not do away with the necessity of a covered yard-space. In most of the metropolitan works, and elsewhere in England, the covered yard-space was inadequate for proper working. The coals were at times obliged to be exposed; and it was well known that the use of wet coals produced from 10 to 15 per cent. deterioration, and coke, by exposure to wet, was deteriorated to the extent of 15 per cent. The use of wet coals also led to the production of an increased quantity of bisulphide of carbon and carbonic acid. Dr. LETHEBY deprecated a higher temperature than a cherry red or a full bright red, anything beyond that breaking up the hydrocarbons in the tar, and he blamed the London managers for working at too high heats. But with good Newcastle coal, Mr. H. JONES had found that the best results were obtained by a bright orange, or nearly white heat, 2,200° to 2,300° Fahr. The settings would last for about three working years. He employed D retorts 18 inches by 13 inches, by 20 feet long. A bench of seven would carbonize, in twenty-four hours, 8 tons 8 cwt. of coal, giving 5 tons 17 cwt., or 70 per cent., of coke, and producing from 10,200 to 10,300 cubic feet of gas of 13 to 14 candle power with 18 per cent. to 20 per cent. of fuel, using six-hour charges. With that heat, he believed some of the light oils in the tar were decomposed. The anthracine obtained from the tar was a valuable product. Dr. LETHEBY had made a useful proposal that the exhauster should be placed before the condenser. He quite agreed with the reasons assigned, and should be anxious to try the method. Hitherto the position of the exhauster had generally been after the scrubbers or after the condenser. In many works he had moved the exhauster from beyond the scrubbers to immediately after the condenser. The reason, he thought, why this plan had not been adopted was the difficulty of dealing with the high temperature of 100°, and with so much tar in the gas to pump. The author recommended rotary exhausters. Mr. H. JONES had used many of these, and had also employed reciprocating exhausters; the result of his experience was that with the latter there was a saving of from 50 per cent. to 60 per cent. upon the former; he alluded especially to wear and tear, and to the consumption of fuel. With suitable designs, and a properly-placed hydraulic main, there should be no stoppages in the ascension pipes. He was connected with many works in which there was no trouble of that kind, and if such a thing occurred, the insertion of a grating at the mouth of the retort reduced the temperature and removed the obstruction. He thought that stoppages in the hydraulic main arose entirely from neglect. Gas engineers agreed that the temperature of the gas should be controllable. He unhesitatingly said that condensers should be put under cover, as also the scrubbers and the purifiers; it was impossible to keep uniform temperatures when the vessels were exposed to the variations of the seasons. The scrubbers he used were different from any of those mentioned. They were three in number, and were filled with thin boards, on the system adopted by Mr. LIVESAY at the South Metropolitan Gasworks, exposing a large surface and proving very effective. He washed the gas in large volumes in the first and second scrubbers. Instead of a Barker's mill, which distributed only a small quantity of liquor, he had two entries for it, through which large quantities were discharged, like heavy rain. The result was that he could concentrate the liquor up to about 20 ounces. The strength was not generally so high as that, because the liquor was usually treated at the works; but where it was sent away, it was concentrated to about 20 ounces without difficulty. He finished by cleaning the gas with pure water. The effect of drenching the gas with liquor was to break up the bisulphide of carbon and to enable the gas to be much more easily purified. Lime varied so much in different parts of the country, and was so offensive after being used for purification, that managers were often in great difficulty as to how to dispose of it. In some works he used the lime first for the purpose of removing the carbonic acid gas, and he afterwards got rid of the sulphuretted hydrogen by an oxide. He preferred LAMING'S system for preparing the oxide, because by it some of the carbonate of lime was turned into sulphite, and that assisted in freeing the gas from carbonic acid that might otherwise pass. The oxide could be treated in two ways—by manual labor, or by sending a blast of air through it by means of steam. He had adopted the latter system in one case, the result being that the purifiers were kept 4 months in action, the steam being employed for 4 hours out of every 72 hours. When the material was done with, it was worked over again, until it had absorbed all the sulphur that it would take up. He had gradually reduced the number of sieves to only one, putting the lime on thicker; and he found no disadvantage from back pressure. The superficial area at the top of a purifier was, he thought, the right indication of its power of purifying, and not the bulk of material got into it on a series of tiers of sieves. Fifteen years ago he was connected with the late Mr. GEORGE LOWE in some works, and they then tried a good many gasholders made without framing; but no great economy was effected; and he had long discontinued their use. There was not much saving in the first cost; there must be a certain pressure to force the gas through the mains, and in the case of medium-sized gasholders without framing, so as to be economically constructed, there was not a sufficient weight of metal to give the necessary pressure. In a large gasholder, with a strong curb and heavy plates, he could understand no framing being used, but with holders up to 150 feet in diameter he should certainly always put in framing. The description of material for building a tank would depend much upon locality. In many places he should hesitate to adopt concrete for building a gasholder tank, although he had done so in other constructions for water tanks. The governor, as generally used, was an exceedingly delicate and a correct instrument, not necessitating such additions as a throttle valve. The Ratcliff was a small district, with heavy lighting on the whole of it, and 6 per cent. unaccounted-for gas was certainly under the average. He considered 10 per cent. to be a fair average. In London, the public lighting was not equal to that in most other towns. As there was a limitation of 1 inch pressure up to twelve o'clock, and after that only ½ inch, that might partly account for the small loss stated. For the consumers a sufficient and equal pressure, and uniform quality of gas, were as desirable as cheapness. He thought that recent legislation, requiring gas of high illuminating power, was a mistake. In the act of 1860, gas with an illuminating power of 12 candles was named, and since that period this had been raised to 16 candles. The reason why engineers were obliged to use cannel coal with the Newcastle coal, was not the high heats employed, but the necessity of furnishing gas of that illuminating power, as it could scarcely ever be got out of the best Newcastle coal, with a fair yield of gas per ton. If the standard were reduced to 13 or 14 candles, he believed the gas would be more uniform in quality, and the public would certainly have the benefit of a reduced price. The burner generally employed in London, the union jet, was not a suitable one, as it allowed a great deal of gas to pass off unconsumed. He had lately observed, in his own room, where there was a six-light chandelier, a close and offensive smell. By employing one of SUGG'S London burners, the Argand burner, the atmosphere of the room was at once rendered pleasant, and a greater amount of light was given. The late Mr. NEILSON was the inventor of

*A paper read before the Institution of Civil Engineers of London, January 12, 1875.

the union jet, or fishtail burner, and he always said that it was wrong to adopt it for burning poor gas, it having been designed for consuming the rich gases made in Scotland. He did not patent the burner; but if he had done so, it would, in Mr. Jones' opinion, have proved more valuable than his hot blast.

Mr. Kirkham said the superiority of the stage retort house over the ground-floor system depended, in his opinion, upon the magnitude of the works or the quantity of coal to be manipulated in twenty-four hours; also on the price to be paid for land. In large works the irregularity with which the coal was delivered, and the short time in which it had to be unloaded, necessitated the building of stores, with machinery for discharging and distributing the coal, and the dimensions of the stores could only be determined by circumstances. The advantages of the stage-house were the protection afforded to the men, and a saving in labor and fuel. Thus the coke, on being drawn from the retorts by the stokers, fell through a space between the front of the stage and the mouth-pieces of the retorts, into vaults below, where it was extinguished by the coke-men, and put into the dealers' carts direct, or thrown back till required. The stokers, whilst drawing the retorts, were not exposed to the heat given off from the body of red-hot coke lying in the barrow, nor had they to wait whilst the barrow, when full, was being removed and replaced by another. Nor had the men to wheel the coke into the yard to extinguish it; thus they were shielded from rain and extreme changes of temperature. This protection to the men enabled them to do more work, with greater comfort to themselves. In the stage-house, the furnaces being accessible from below, the removal of clinkers was performed with less labor, and fuel was saved. The total manufacturing wages were not, in his opinion, the correct figures to be employed in estimating the relative cost of labor in the two systems. A certain amount of coal had to be put into the retort, and the coke had to be drawn out and extinguished. In the case of the ground-floor, as mentioned by the author, the number of men employed for twelve hours, to manipulate 25 tons of coal, was about twelve and a half, the gang consisting of two scoopmen, four stokers, four cokemen, one trimmer, and one fireman and a half. The cost was £3/2 1cd., or 30·1d. per ton of coal carbonized. For the stage-house a gang consisted of nine men—two scoop-men, four stokers, two cokemen and one fireman. These men did the same amount of work, and as stated before, with greater comfort to themselves, than the twelwe and a half men in the other case. The cost was £2/9 6d., or 23.75d. per ton of coal carbonized, showing a difference of 6·35d., or 21 per cent., in favor of the stage work.

The cost of a retort house that would produce 1,200,000 cubic feet of gas in twenty-four hours had been £24,400, including heavy foundations, chimney, roofs, coal stores with roofs, machinery for unloading barges, railway over coal stores for distributing the coal where required, and one hundred and twenty retorts set complete and ready for work. A retort house to make 1,000,000 cubic feet of gas in twenty-four hours would, according to that proportion, cost £22,190. Buildings slightly constructed, and consequently at less cost, must, in his opinion, necessarily entail greater wear and tear, and this was shown by the two cases cited by the author, comparing very unfavorably with the aggregate of companies in London. The first company mentioned had a capital of £5 1s. 6d. per ton of coal carbonized, and the percentage of wear and tear was 5·22d. on the capital employed. In the second case the capital was £5 17s. 6d. per ton of coal carbonized, and the percentage of wear and tear was 4·87d. In the case of another large company the capital was £7 8s 4d. per ton, and the wear and tear 2·45d. The aggregate of all the companies in London showed a capital of £7 2s. 1d. per ton, and a percentage of wear and tear of 2·5d.

With regard to the saving supposed to be effected in the cost of the ground-floor retort house, the author assumed an extra cost for the stage of £8,000, but how that sum was arrived at he was at a loss to understand. In the case of the stage retort house, to which he had alluded, the actual cost for the extra wall below the stage floor, together with the pedestal for carrying the ovens and the stage itself, with cast-iron columns and girders supporting it, was £3,500. Reduced, in proportion for the smaller retort house, the cost would be £3,200. The interest on that, at 10 per cent., together with 1 per cent. for wear and tear, would give a total extra charge of £352. The saving of labor, as before shown, was 6·35d. per ton, and this on 20,000 tons (the quantity of coal required to make the 203,000,000 cubic feet stated) gave a total of £529. Deducting from that the £352, there was an actual saving in favor of the stage house of £157 annual charge.

The contrast between the Ratcliff Company and the Imperial Company was considerable, 20,0000 tons of coal being consumed by the former, and 400,000 tons by the latter. If the amount paid per ton of coal for manufacture and distribution, together with the wages and material for wear and tear, were compared, it would be seen that there was a difference in cost in favor of the Imperial to the extent of 3s. 6d. on every ton of coal carbonized, thus :

	Ratcliff. d.	Imperial. d.
Manufacturing charges.		
Wages	47·44	37·72
Wages and materials for wear and tear	68·62	43·78
Distribution charges.		
Wages	8·62	7·12
Wages and materials for wear and tear	12·05	5·38
	136·73	94·00
Ratcliff	94·00	
Difference ... 42·73d.=3·56s.		

This, on the quantity of coals, 414,176 tons, consumed in 1873, represented a sum of £72,480 extra that would have had to be paid in one year.

With regard to the construction of gasholders, there were great differences of opinion. He had constructed many of various sizes, one being 230 feet in diameter; and his opinion was, that the top of a gasholder should be in the form of a dome, with trussing, in preference to its being flat and without trussing. In the flat top, the strain on the sheeting was very unequal, the plates not being set at an angle, such as they would assume when the weight was brought to bear upon them on the gasholder rising. The rise of the dome should not be less than 1 in 10, and the center column forming the kingpost should be double that amount. The trussing supported and strengthened the outer top curb. One end of each of the main radius-bars forming the trussing was attached to the curb, the other end to the top of the center column or kingpost. The ends of the tie-rods of the main radius-bars were attached to the main bars near the curb, the other ends passed through a ring at the bottom of the center column; the ends of the tie-rods were provided with screws, with nuts for adjusting and fixing each main radius-bar in its proper form, and, if equally adjusted, the framing of the top, with the curb attached, might be rolled about like a hoop. The curb with framing should rest on the top of the vertical stays which supported the sides of the gasholder, as the roof on the walls of a building. The sheeting of the top was attached to the framing in such a manner that the weight to be carried was divided equally over its surface. This was effected by clips, which consisted of a cross-bar with two bolts, one placed on each side of the main or other bars, and passed up through the sheeting, to the top of which, at each point, a plate or washer was fixed for the nuts on the upper ends of the bolts to screw down upon; these clips ought to be so arranged that between every four there should not be more than 100 superficial feet. When the framing of the gasholder was screwed up into its proper position, the plates should be put on, not in rings, but in segments, between gusset plates, radiating from the center. If the plates were put together in rings and riveted, they gathered considerably, causing the top sheeting to be buckled and very irregular. By arranging the plates as before mentioned with gusset pieces, this inequality of the surface of the top sheeting was prevented. He knew of one or two gasholders with flat tops which could not be grounded, or if they were they would never rise again.

TO BE CONTINUED.

The Erection of Zinc Works, and the Metallurgy of Zinc.

By Francis Laur.

(Bulletin de la Société del Industrie Minérale, No. 3, 1874, pp. 395—445).

The importance of carefully selecting a site for zinc works is obvious, when it is stated that the production of 1 ton of this metal requires nearly 10 tons of material, viz., 6 tons of coal, 3 tons of ore, and 7 cwt. of fire-bricks and clay.

Since an establishment capable of yielding 10,000 tons of zinc annually will require from 90,000 to 100,000 tons of material, the smallest saving in the cost of transport of ores and fuel may materially influence the financial aspect of an undertaking. The establishment of zinc works also requires a considerable amount of capital, on account of the numerous accessories necessary for the production of various forms of merchantable zinc.

The author states that, having been called upon to study this problem, on the occasion of establishing large zinc works in the South of France, he had become impressed with the importance and complication of the preliminary calculations which should be made before fixing upon a site for such works. The present paper embodies the results of his observations.

The zinc trade is now passing through a crisis, the result of three causes, viz.: the labor difficulty, absence of improvement in the processes employed, and the unfavorable position of many of the established works.

With respect to the metallurgy of zinc, no progress has been made since the year 1830. The treatment of zinc ores consists in heating a mixture of impure oxide of zinc and carbon in close vessels, to which are adapted appliances for the condensation of the resulting metallic vapors. Two things only admit of being varied in this arrangement; the apparatus containing the vessels to be heated, and the retorts themselves in which the reduction of the zinc is effected. Almost every possible modification of these elements has, at one time or another, been tried. There have been furnaces inclosing a large number of retorts, and retorts holding a large quantity of ore; small furnaces with large muffles of the old Silesian type, and small furnaces containing numerous small retorts of the old Belgian form; there are also capacious furnaces with large distilling vessels, as at Angleur, and others, as at Flône, with a lower row of large muffles and an upper one of small cylinders; large furnaces with two or three rows of small muffles have likewise been tried. The experiments have, however, indicated that the dimensions of the vessels and furnaces cannot be safely changed except within certain limits, and in the best managed establishments something like a mean has been ultimately arrived at.

Notwithstanding the difficulty of such generalizations, a review of the experiments on the relative size of the furnaces and of the inclosed distillatory apparatus appears to lead to the following rules :

1st. It is not prudent to construct furnaces of which the internal capacity materially exceeds 32·5 cubic yards.
2d. The thickness of the charge to be reduced in the vessels, crucibles, or muffles, should not exceed 7 inches; and the vessels should never be more than 19·7 inches in height and 4·92 feet in length.
3d. A capacity of 22 gallons is regarded as the maximum which can be advantageously given to a vessel in which distillation is effected.
4th. The total interior available volume of the whole of the distillatory vessels placed in the heating chamber should be about one-third of the volume of the interior of the chamber itself. Experience shows that nearly two-thirds of the interior capacity of a furnace is required for the supports, and for the free circulation of flame, and heated gases.

The fire-place is entirely independent of these data, as the problem varies with each locality, with the nature of the fuel, and with the type of furnace. In all cases, however, a bright red heat should be attained, and this temperature should equally pervade very part of the furnace.

The normal loss of zinc may be taken at 20 per cent. of the metal produced. The following is the total annual production of zinc in Europe :

	Tons.		Tons.		Tons.
1846	40,000	1857	79,000	1866	110,000
1850	50,000	1858	90,000	1870	130,000
1853	62,000	1860	98,000	1873	129,000
1856	71,000	1862	100,000		

M. Laur's paper is accompanied by drawings and, besides minutely describing the different processes for the treatment of zinc ores, furnishes cost of production, together with estimates for erection of plant; it may, therefore, to a great extent, be regarded as a monograph on the present state of the metallurgy of zinc.

P. 'B.

The Mineral Resources of Victoria.

The Mineral Statistics for 1874, just issued by the Department of Mines, are very gratifying to all who feel interested in the prosperity of the colony; for, although the gross yield of gold, as measured by the exports and the gold minted, is less than that of 1873, the average per man per annum is greater than it has been for many years past. Quartz veins giving more than 3 oz. per ton have been found at depths exceeding 800 ft., and more than 190 ft. below the level of the sea; and there is no doubt that, when the numerous auriferous veins are more extensively developed, the colony will find in them lasting stores of wealth. The several data were obtained from diverse sources, and the character of the gentlemen from whom the department receives information is a sufficient guarantee that no avoidable mistakes can have been made, and there is no available check that has not been used in order to make the tables

accurate and complete. The estimates of gold raised during the year showed that there was exported, according to returns furnished by the Commissioners of Trade and Customs, 904,154 oz. There were received at the Melbourne branch of the Royal Mint 251,818 oz.; raised according to estimates made by the mining registrars, 1,097,644 oz.; and purchased, from returns made by managers of banks and others, 1,015,115 oz. It appears that 967,069 tons of quartz yielded at the rate of 11 dwt. 20¼ grs. per ton; 69,439 tons of quartz tailings, mullock, etc., yielded 2 dwt. per ton; and 6725½ tons of pyrites, blanketings, etc., yielded 2 oz. 16 dwt. 8 grs. per ton. As compared with 1873, there is a small decrease in the quantities of vein-quartz put through the mills, but the gross quantity of gold obtained from vein-quartz in 1874 was 6006½ oz. in excess of that got in 1873.

The decrease in the mean number of miners employed during 1874, as compared with the preceding year, was 5545; and as compared with 1872, the decrease was 8147. The withdrawal of such large bodies of men from an occupation that, on the whole, gives good returns for the labor bestowed on it is the cause of the great reduction in the produce of gold. While the average earnings per man per annum continue to increase, the numbers engaged in gold mining decrease; and if there were not great inducements held out to miners to abandon mining operations, the yield of gold, instead of falling off, would be greater than in former years. The miners have now better machinery and better appliances for saving gold than they ever had; and yet they are leaving the mines, in order to engage in other pursuits. Some interesting information has been obtained from Mr. Hayter, the Government statist, as to the number of hands employed in certain kinds of labor in 1866 and 1874, and, excluding females, it is shown that between those dates the number employed on farms increased from 33,147 to 56,581; on squatting runs, the decrease was from 6799 to 5128; in breweries, the increase was from 614 to 988; in flour-mills, from 632 to 725; and in manufactories, works, etc., from 7628 to 18,921; giving a total of 48,820 in 1866, and of 82,343 in 1874. The number of Chinese miners has diminished from 15,079, in 1870, to 21,180, in 1874. The average earnings of gold miners in 1874 was £99 8s. 3d. per man. There has been no higher average than this during the past 18 years, except in 1868, when an average of £104 18s. 9½d. was reached.

With regard to metals other than gold, it appears that during the year 180 tons of silver ore were raised, and 11,906 oz. of silver obtained, of which 11,146 oz. 5 dwt. were parted from gold smelted at the mint. The exports of tin ore during the year were 112 tons 14 cwt., and of tin, 86,016 lb. Of copper, 10 tons 2 cwt. were exported. There were raised during the pear 588 tons 7 cwt. 3 qr. 9 lb. of antimony ores, and 221 tons of antimony regulus were exported. The quantity of lead ore raised during the year was 111 tons. Of iron ore, 130 tons 10 cwt. were raised. Of coal, 2909 tons, and of lignite 750 tons were raised. There were also raised 1961 tons, 2 cwt. of flagging, and 85 tons of slates.

Sulphur Mines of Sicily.

By Ch. Ledoux.

(Annales des Mines, part 1, 1875, pp. 1—84, 2 pl.)

Italy has hitherto enjoyed an almost exclusive monopoly in the supply of sulphur (brimstone) throughout the world; the mines in Spain, France, Greece, on the shores of the Red Sea, and elsewhere, being of secondary importance. There are a few, besides, in Tuscany and in the Romagna, but by far the largest number are in Sicily, where the annual production of sulphur amounts to very nearly 200,000 tons. For the sake of economy, sulphuric acid is now commonly made from iron or copper pyrites; but these ores contain so much arsenic as to render the acid injurious in some industries, and if brimstone could be brought into the market somewhat below its present price, it would be preferred to pyrites, and its consumption would be much increased.

In the year 1871, the author visited the Sicilian mines of Lercara, Casteltermini, Racalmuto, Caltanisetta, and Grotta Calda, but he has largely availed himself of information published in 1870 and 1871 by M. Mottura, who, by the order of the Italian Government, made the geological map of the mining districts of Sicily, and likewise, in 1873, by M. Parodi, both engineers of the Royal Italian Corps of Miners.

The production of sulphur in 1870 was—

		Metrical Tons.	Estimated Value when shipped.	Estimated Cost at the mines.
In the district of	Caltanisetta	70,429	£341,057	£136,233
" "	Girgenti	83,360	397,183	133 214
" "	Catania	19,180	96,113	33,603
" "	Palermo	7,358	36,787	11,831
	Total	180,327	871,140	314,881

About one-half of this sulphur was shipped at the port of Girgenti, and the rest from the ports of Licata, Catania, Torrenova, Messina and Palermo.

The roads in Sicily are very bad, and a great part of the sulphur has to be conveyed on mule-back. From the district of Caltanisetta, however, about one-half is conveyed in carts, and in the province of Palermo and Catania the mines are able partially to avail themselves of the two portions of the central railway now in operation; but the railway tariff is exorbitant, and the average cost of transport from the mines to the seaports amounts to about £1 per ton of sulphur.

The mines belong to the owners of the surface soil, and are usually leased, for periods of about nine years, to the miners or mining companies, at rates varying from 20 per cent. to 50 per cent., and averaging at least 25 per cent. of their gross annual product. This is equal to a royalty at the rate of 16s. 5d. per ton of the produce. Such an arrangement is very prejudicial, as it becomes an inducement to the miners to work only the richest veins, and large quantities of ores less rich in sulphur are left in the mines and wasted. There is also so much dishonesty in the conduct of all the operations, that M. Parodi asserts that the management of this industry is, in the majority of cases, nothing less than an organized brigandage.

The geological formations in which the sulphur is found, commencing at the surface, usually occur in the following order:—

1. Marly limestone (called Trubi).
2. Saccharoid gypsum containing fossil fresh-water fish.
3. Argillaceous limestone and marl, mixed with beds of sulphur and gypsum.
4. Compact limestone, sometimes silicious.
5. Tripoli, containing numerous fresh-water shells and fossils of fish and insects.

Below these formations, deposits of rock salt are met with, and also bituminous deposits which often contain petroleum.

The gypsum (hydrated sulphate of lime deposits) appears to have a close connection with the sulphur beds, and to owe its origin to similar causes, causes which must have formed both simultaneously.

The sulphur ore is disseminated through the mass of calcareous matter, sometimes in irregular veins, or pockets, and sometimes in small beds parallel to the stratified limestone, clay, or gypsum. The beds of ore vary from 6 feet to 27 feet in thickness, the usual average being about 13 feet, as at Caltanisetta. At Grotta Calda there are three beds, separated by from 3 feet to 5 feet of marl.

At the great mine of Sommatino there are six beds of sulphur ore varying from 6 feet to 26 feet in thickness, separated by unproductive layers, each about 3 feet thick.

At La Croce (Lercara) the sulphur beds attain a thickness of 114 feet. There is great irregularity both in the inclination and in the direction of the beds. The outcrops rarely contain any sulphur.

The average richness of the ore in sulphur is:

	Per cent.
At Madore (Lercara)	20
At Grotta Calda	25 to 27
At Sommatino	22
At Cimicia (Racalmuto	21

In other mines it falls as low as 11 and 12 per cent.

The mines are worked in a most primitive way; vertical shafts, horizontal galleries, and the use of timber, are unknown. When the inclination of the beds does not exceed 45°, it is customary to commence by working downwards in the bed, and to cut steps in it so as to allow the ore to be brought up on the backs of boys and young men of from eight to eighteen years of age, who carry, according to their strength, a weight of ore varying from 40 lb. to 80 lb. At all the three hundred and fifty mines in Sicily, with the exception of four, the ore is brought in this way to the surface—the boys being employed and paid by the pickmen. The consequence of this is that the carriage of the ore to the surface is the most costly item in the whole of the mining expenses.

The average daily work done by a pickmen is rather less than 1 cubic yard of ore, which measures in the pile 1·5 cubic yard, and weighs 1 ton 8 cwt. His wages average 2s. per diem; but the price paid to the miners always includes the total cost of extraction, piling the ore, oil, tools, powder (when used), etc.

When the mine is not more than from 131 feet to 164 feet in depth, and not much water is met with, if the annual production is at the rate of 5200 to 6500 cubic yards, the average cost of extracting the ore, according to M. Parodi, is as follows:

	s.	d.
Mining	1	4·3
Carriage to surface	1	7·2
Tools and oil	0	3·8
Piling the ore	0	1·9
Maintenance of the works	0	5·7
Pumping water	0	1·9
Superintendence	0	2·7
Total	4	3·5 per ton of ore.

To these figures must be added:

	s.	d.
1. General management expenses and interest on working capital	0	5·5
2. Tax of about 3 lires per ton of sulphur	0	4·1
3. Amortisation of capital	0	1·3
	0	10·9

which brings up the total mining expenses to an average of 5s. 2·4d. per ton of ore.

Fusion of Ores.

As sulphur will melt at the low temperature of 239° Fahr., it would appear, at first sight, to be an easy matter to separate this metalloid from the matrix. But singular difficulties are found to interfere with this in practice. If the temperature is raised above 320° Fahr. the sulphur becomes viscous, and it is not easy to keep the temperature between the limits of 239° and 320° Fahr. Then, also, fuel is expensive in Sicily, and a barbarous system of burning the ore in kilns or *calcaroni*, has, in consequence, become generalized throughout the country. This system consists in piling the ore on a sloping floor, surrounded by a low wall, and setting fire to the upper portion of the pile. As the fire gradually descends the lower layers are heated, and the liquid sulphur runs off and collects at the bottom. The calcaroni are built of all dimensions, varying in capacity from 32, 65, 162, 585, to even 1560 cubic yards. They require to be carefully charged, as negligence in this respect will occasion a loss of 10 per cent., or more, of sulphur. The largest lumps of ore are placed at the bottom and in the center, the smallest at the top and round the sides. Upright flues are built at intervals in the ore to facilitate the combustion. At the lowest point of the sloping floor a narrow and thin partition, called the *morte*, is so arranged that the liquid sulphur all converges at this point, and when a sufficient quantity has collected it is drawn off into moulds through small holes tapped in the *morte*. From three to four weeks are usually required to melt sufficient sulphur to commence drawing off, and it continues to melt and to be daily tapped during a further two or three weeks. The largest calcaroni require three months for the complete operation.

There is, of course, a great deal of sulphur burned and wasted by this process. The loss often amounts to 50 per cent., and can rarely be estimated at less than 35 per cent. A great deal of experience is requisite on the part of the men who attend to the fusion, and they form a special class called *arditori*. Ores containing less than 15 per cent. of sulphur cannot be treated in calcaroni, as the loss incurred with such ores is so considerable that their fusion is altogether unprofitable. A gypsum matrix gives very unfavorable results, because much heat is wasted in vaporizing the hygrometric water, and some sulphuret of lime is formed, which darkens the color of the sulphur.

So much sulphurous acid escapes from the calcaroni that, being injurious to the surrounding population and vegetation, they are required by law to be placed at a minimum distance of 220 yards from dwelling-houses, and of 110 yards from cultivated lands, otherwise they may only be used between the 1st of August and the 31st of December.

The sulphur thus obtained is discolored by the action of the fire, and must be refined by distillation after it is brought to France or to England.

The average net production of sulphur from the ore when fused in calcaroni is:

	s.	d.	
At Madore, 12 per cent., and the cost of fusion	7	0·5	per ton of sulphur.
At Racalmuto, 14 per cent., " "	4	4·8	" "
At Grotta Calda, 17 per cent., " "	3	10·0	" "

M. PARODI estimates the average cost of 1 metrical ton of sulphur fused in a calcarone to be :

	s.	d.
By 7 tons of ore, at 5s. 2·6d. per ton	36	6·2
By fusion of ditto	4	2·8
	40	9·0
Add royalty to the owner of the soil	12	0·0
Cost of 1 metrical ton of sulphur	52	9·0

But the author considers this price too low, and is of opinion that the average royalty cannot be taken at less than 16s. 4·8d. per ton, because the value of the sulphur at the mines is 65s. 6d. per ton, and the average royalty is one-fourth of the gross product in sulphur.

Fusion of the sulphur by means of steam under pressure has been introduced at some of the mines, as at Lercara, Sommatino, La Croce, Floristella, and at Latera, in the Romagna. It has not everywhere answered, and at Montedoro, where the matrix is argillaceous, after adopting the process in 1871, it had to be abandoned ; but, notwithstanding the contrary opinion of M. PARODI, the author expresses himself much in favor of it. The apparatus introduced by the Milanese Company, (which owns the patent,) consists of an upright cylindrical iron vessel holding about 3½ tons of ore, and pierced with small holes to admit the steam, over which is placed another iron cylinder of somewhat larger dimensions ; this cylinder is perfectly tight, and between it and the first cylinder the steam is admitted. The steam is generated under a pressure of about 52 lb. above the atmosphere, and has a temperature of 302° Fahr. It penetrates the ore throughout, and in about one hour and forty-five minutes the sulphur is fused and run off into moulds. This apparatus can be charged seven times every day, and will melt about 24 tons of ore per diem. The consumption of coal in the boilers used at Lercara, for heating four such apparatus, is 2 tons 8 cwt., or at the rate of 12 cwt. per diem for each 24 tons of ore. Each apparatus costs £240 delivered at the mines, and the cost of the boilers, buildings, and installation comes to about as much more.

The cost of fusion by this process is estimated by the author as follows :—

	Per ton of Ore. s.	d.	Per ton of Sulphur. s.	d.
Labor { engineer and stokers	0	2·0	0	9·6
Labor { charging and discharging the ore	0	9·6	4	0.0
Coals, at 47s. per ton	1	1·5	5	7·2
Water, at 3s. 7·8d. per cubic yard	0	8·1	3	4·3
Maintenance	0	3·3	1	4·3
Superintendence and management	0	2·2	0	10·5
Amortisation at 1-5 of £480 per annum per apparatus &c	0	4·2	1	9·1
Total	3	6·9	17	9·0

This does not include the sum charged by the patentees, who sometimes undertake the fusion by contract, at from 29 to 32 per cent. of the gross production of sulphur, and sometimes charge for the use of the apparatus at the rate of £180 per annum, which charges the author considers excessive.

The cost of fusion by the steam process is thus seen to be much greater than when calcaroni are employed, the calcaroni not being charged with the value of the sulphur burned in them ; but, on the other hand, owing to the use of coal as fuel, there is a considerable saving in the quantity of ore required to produce each ton of sulphur. Thus ores containing respectively 26, 21½, and 16½ per cent. of sulphur will yield, by the steam process, 24, 20, and 15 per cent., and by the calcaroni, only 17, 14, and 10 per cent.

It follows that the quantities of ore required for the production of 1 metrical ton of sulphur are respectively :

	Tons.	Tons.		Tons.
When steam is used	4,170,	5,000,	and	6,670.
When calcaroni are used	5,880,	7,140,	and	10,000.

And the total cost of the ore is :

	s.	d.	s.	d.		s.	d.	
When steam is used	21	10,	26	2,	and	34	10	per ton of sulphur.
When calcaroni are used	30	11,	37	5,	and	52	4	" "

Taking into consideration this saving in the cost and quantity of the ore, it appears that, notwithstanding the heavy payment to the patentees, an economy is effected by the use of steam in the fusion of the richer ores amounting to :

	s.	d.	
When using ores containing 26 per cent	1	0	per ton of ore
" " 21·5 "	0	3·3	" "

But when using ores containing only 16·5 per cent., the economy results in favor of the calcaroni at the rate of 5d. per ton of ore.

This calculation is based on the supposition that the average cost of the ore is 5s. 5·2d. per ton, and the average value of sulphur at the mines 65s. 10d. per ton, the royalty to the patentees being 8·5d. per ton of ore.

The sulphur is worth at the mines 65s. 10d. per ton when the average value shipped at the seaports is 96s., which is the price put upon it by M. PARODI, who gives the following analysis of this sum :—

	s.	d.	
Cost of sulphur at the mines, including royalty to the owner of the soil	52	10	
Miners' profit	12	10	
Carriage to the seacoast	19	10	
Shipping charges	2	6	
Export duty	8	0	
Shipping price of sulphur	96	0	per ton.

The present price shipped is higher than this.

The author quotes M. PARODI to show that it would be possible when the railways in the island are completed, by reducing their tariff from 2d., which is now charged, to 0·8d. per ton per mile, and by also remitting the export duty, to lower the price of sulphur free on board to 76s. per ton, which would allow of its being sold at Marseilles at from 88s. to 92s., and in England at from 100s. to 104s., in which case it might compete with pyrites at Marseilles ; but, for reasons which he gives, he is not of opinion that such a reduction in the price is at all probable.

O. C. D. R.

Price of Gas in Pittsburgh.—A communication was received by the gas committee from the East End Gas Company, in which the company offered to furnish the city with gas at $1 25 per thousand feet, provided the city agree to enter the contract for fifteen years. The present price is $1 65 per thousand feet. After some discussion the communication was referred to the City Attorney.—*Pittsburgh Commercial*, Oct. 6.

SELECTED LIST OF PATENTS.

FOR THE WEEK ENDING OCT. 16, 1875.

RELATING TO MINING, METALLURGY, GAS MAKING, ENGINEERING, &c. REPORTED FOR THE "ENGINEERING AND MINING JOURNAL" BY LOUIS BAGGER & CO., SOLICITORS OF PATENTS, WASHINGTON, D. C.

No. 168,174. Furnaces, N. L. Newcomb, Cleveland, Ohio.—This consists of the combination with a furnace of one or more flues, adapted to receive air from under the grate and to discharge it within the furnace above the grate bars. Also, the combination with a furnace of a fire-wall, placed immediately behind the grate bars, and extending well up into said furnace, and one or more flues receiving air from below and discharging it at the upper portion of said fire-wall and over the grate bars.

168,263. Manufacture of Iron, A. C. Lewis, Brooklyn, N. Y.—This is a method of removing foreign substances from iron, by a mixture of infusorial earth, found in Nevada, wolfram, and manganese, as a "physic" in puddling.

168,293. Melting and Treating Iron, Wm. Sliecher Jr., Troy, N. Y.—This process of melting and refining iron consists of adding in the cupola a fuel of about two-thirds coke and about one-third charcoal, and running the molten metal from the cupola to a reverberatory furnace, and thence to a second independent reverberatory furnace from which the metal is tapped for foundry uses. The inventor also claims as novel his combination of the cupola, first and second independent reverberatory furnaces, and chimney.

168,345. Ore Stamps, Wm. C. Furgusson, St. Louis., Mo.—The stamp shaft is lifted by means of a cam which has a descending pitch, in order that, as the force required to compress the spring increases, the amount of compression is proportionally diminished, and the power required to revolve the cam remains constant.

168,146. Tunnels, O. B. Dowd, New York, N. Y.—The tunnel tube consists of elliptical sections, with lugs and fastenings on their interior, to convey the sections through a completed portion of the tube. The shield is enlarged to introduce the sections and secure them against the completed section. Stop-pins pass through the sections to prevent the shield from being pressed back on the tunnel. Packing and a follower are arranged between the tunnel and shield to prevent leakage.

168,265. Gas Apparatus, Philip W. McKenzie, Blauveltville, N. Y.—Air to incite combustion is admitted at the top of a steam super-heater, subsequently all air inlets are closed, and combustion is supported by the oxygen of the steam admitted through annular space between coal and coke at the grateless bottom. The inventor claims as his own : The sectionally constructed retort encompassed by a flue and composed of compartments mounted one upon the other, in combination with contracted apertures connecting these compartments, a steam inlet to the upper compartment, and a steam outlet below connecting said retort with the decomposing chamber of the apparatus.

168,290. Hydro-Carbon Gas Apparatus, C. F. Schussler, Hamburg, Germany.—A feed wheel provided with buckets raises the hydro-carbon fluid and empties it into the upper part of a coil pipe through which it descends, while a blast of warm air is forced through the pipe in the opposite direction. A water heater and a blast apparatus are connected with the carbureter.

168,191. Tar Gates for Hydraulic Mains in Gas Works, J. M. Slaney, Camden, N. J.—To the end of the hydraulic main is affixed a valve-chest, with a tar outlet on a level with the mouth of the dip-pipes. The outlets are governed by vertically sliding gates. An outside index and scale show height of gate. A wrench on the gate screw is locked against a stop to prevent meddling. There is a direct emptying outlet from main to tar pipe.

Notes.

Sutro Tunnel.—A proposition to increase the capital stock of the Sutro Mining Company from $2,400,000 to $10,000,000 will be decided on the 11th of November.

A telegram from Pottsville states that the mills of the Palo Alto Iron Company, which have been idle for more than a year, resumed operations yesterday. About 200 men are employed in the mills, at a reduction of 25 per cent. from their former rates of wages.

Miles of Railroad Completed in 1875.—The *Railroad Gazette*, of the 16th inst., reported 861 miles of new railroad completed in the United States since January 1st, 1875, against 1125 miles reported for the same period in 1874, 2867 in 1873, and 5066 in 1872.

The Potosi Silver Mine, near La Plata, Peru, is employing about two thousand men. It has been worked almost continuously since its discovery in 1585, and has yielded, it is estimated (as no systematic record has been kept), about $250,000,000 in bullion.

The National Tube Works Company, who have works at McKeesport and at Boston, are now manufacturing two or three hundred gas tanks, of seamless wrought iron, fourteen inches in diameter, for the Pennsylvania railroad, for carrying gas to light their passenger cars. These were formerly made of riveted sheet iron.

Colorado Coal.—An estimate of the coal mined from the coal formation of Colorado Territory has lately been compiled by Capt. E. L. BERTHOUD. The compilation embraces eighteen coal mines, extending from Cañon City to the St. Vrain River. The total amount mined from January 1st, 1864, to October 1st, 1875, foots up 511,154 tons, valued at $2,044,610.

Dunbar Furnace.—The 6th of October completed the fifth year of the present blast of the furnace. The yearly yield has been as follows : 1871, 7,074 tons ; 1872, 10,394 tons ; 1873, 10,681 tons ; 1874, 11220 tons ; 1875, 13,080 tons. A total of 52,494 tons of 2,268 lb. The raw materials used, in round numbers, are : Ore, 132,000 tons ; coke, 92,000 tons ; limestone, 78,000 tons—a total of 302,000 tons.—Union (Pa.) *Standard*.

Great Feat in Steel Rail Making.—The remarkable feat of making 1,010 steel rails in twenty hours and four minutes' actual working time was accomplished in the steel-rail mill of the North Chicago Rolling Mill Company, on the 8th inst., being an average of one minute and twelve seconds for each rail. The rails rolled weighed sixty pounds to the yard, standard length thirty feet, and were for the Chicago, Rock Island and Pacific Railroad. The total weight of the product being 268 1900-2240 tons. The percentage of second-class rails was one-half of one per cent. The work was done by eight furnaces and a twenty-inch train of fifteen pass rolls, and is the best work ever made "west of the Allegheny," or anywhere else. The Bessemer works of the company have also achieved some remarkable results. From 5:55 A. M. on Friday, the 8th, to 5:11 A. M. on Saturday, the 9th, sixty-two heats of steel were blown, yielding 324 gross tons of ingots. For the week ending Saturday, the 9th, these works made 253 heats, the product being 1,317 gross tons of steel ingots.—Chicago *Inter-Ocean*, Oct. 11.

The New Steamship, City of New York.—The new iron steamship, *City of New York*, built by JOHN ROACH & SON, Chester, Penn., arrived at pier No. 42, North River, last Sunday evening. The *City of New York* is the twentieth vessel completed by the ship-builders named. She is 353 feet long, by 40½ feet wide, with a depth of 39½ feet from the hurricane deck, and 31 feet from the spar deck. She is of 3,750 tons burden, is bark-rigged, and draws sixteen feet at the rudder, and 19 feet at the bow. Saturday last she steamed out to sea nearly 300 miles, the highest speed attained being fourteen miles per hour. She is provided with ten metallic life-boats, and with life-rafts. There are two compound engines and six boilers. There are seven bulk-heads which divide the steamship into eight water-tight compartments, while the aggregate power of all the pumps to free the ship of water is 100,000 gallons per minute. Interiorly the *City of New York* is finely finished. The new steamer goes at once into the Pacific Mail Steamship trade. The officers are : Captain, J. W. PHILIP ; Chief Officer, P. M. RYDER ; Chief Engineer, DENNIS STEPHENS ; First Assistant, C. H. MCCARTY.

Notes.

Death of a Coal King.—W. H. BROWN, the largest coal dealer in Western Pennsylvania, died in Philadelphia, on Tuesday, the 12th of October.

The Kanawha Slackwater.—DULL & DUNN, of Pennsylvania, were successful as bidders for the first lock on the Kanawha River. It is to be 300 feet long by 50 feet wide. The bid was $72,000, or a little over half of the Government engineer's estimate, consequently there is enough left to construct No. 2, which will be put under construction shortly.

Cornelius L. Everitt, Esq., President, and Charles C. Miles, Secretary of the New York Gas Light Company, died; the former, on the 17th inst., at the age of 67; the latter on the 15th inst., at the age of 47. The members of the Gas Association, at their meeting, passed resolutions expressing the high appreciation in which these gentlemen have been held both in their private and professional capacities.

The Electric Light as a Military Signal.—The roof of the Siemens-Halske Factory, at Berlin, was recently the scene of a series of experiments with the electric light, which filled all the streets in the vicinity with a crowd staring with astonishment at a supposed wonderful phenomenon, up in the clouds. The apparatus, which gave a light so powerful that ordinary writing could be read by its illumination at a mile distance, was arranged with an inclosed mirror, so that the rays were projected against the clouds, which served as a screen. In front of the mirror the signals were made, and these were repeated, of course, on a gigantic scale, in the clouds. The light is to be adopted by the German army for night signaling.

Result of Ore-Dressing at the Duncan Silver Mine, Lake Superior Region.—Result of two experiments on ore from this mine, conducted at the Silver Islet Stamp Mill, September, 1875:

1. Headings from battery, 44 lb. weight, dry assay - - 2,058 oz.
2. Concentrations produced 580 " " " " - - 1,217 "
3. Tailings, waste, 17,100 " " " " - - 6 "

No. of Ounces of Silver in rock tested:

1. 44 lb. Headings @ 2,058 oz. per ton—45·2 oz. silver, or 5·1 oz. to ton of ore.
2. 580 lb. Concentration @ 1,217 oz. per ton—352.6 oz. of silver, or 39·8 oz. to ton of ore.
3. 17,100 lb. Tailings @ 6 oz. per ton—51·3 oz. silver, or 5·8 oz. to ton of ore.

Silver lost in tailing, 11·4 per cent.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Oct. 16.

	1875.		1874.	
	Week.	Year.*	Week.	Year.
Wyoming Region.				
D. and H. Canal Co	36,669	2,398,863	54,841	1,878,118
D. L. and W. RR. Co	54,919	2,671,550	51,120	1,954,478
Penn. Coal Co	31,199	1,033,229	27,162	1,054,825
L. V. RR. Co	15,714	739,009	22,414	759,508
P. and N. Y. RR. Co	1,085	80,978	1,578	49,275
C. RR. of N. J	53,549	1,043,019	41,578	1,148,352
Penn. Canal	12,208	224,936	11,104	269,508
Lack. and B. RR.	..	81,493	..	112 529
	205,643	8,323,077	209,797	7,226,993
Lehigh Region.				
L. V. RR. Co	94,042	1,471,228	72 877	2,518,334
C. RR. of N. J	38,918	500,660	29,830	917,138
D. H. and W. B. RR.	1,916	63,581	789	31,769
	134,876	2,035,469	103,496	3.467,241
Schuylkill Region.				
P. and R. R. RR. Co	177,024	3.437 601	171,799	4,055,486
Shamokin & Lykens Val.	28,831	966,714	27,020	746,787
	205,835	4.404,315	198,819	4.802,273
Sullivan Region.				
Sul. and Erie RR. Co	285	6.492	665	29,531
Total	546,639	14,769,353	512,777	15,526,038
Increase	33,862	..	..	..
Decrease	..	756,685	..	..

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

The following Table does not give the entire production of our Bituminous mines, but it is by far the fullest report published.

The Production of Bituminous Coal for the week ending Oct. 16, was as follows:

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md.	Week. Tons.	Year. Tons.
Tons of 2,240 lb	49,587	1,865,530
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	9,211	259,836
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	4,545	169,330
*East Broad Top	1,018	35,796
Clearfield Region, Pa.		
*Snow Shoe	1,010	49,855
*Tyrone and Clearfield	19,855	672,717
Allegheny Region, Pa.		
*Pennsylvania RR	4,202	171,997
Pittsburgh Region, Pa.		
*West Penn. RR	4,678	168,547
*Southwest Penn. RR	1,086	16,482
*Penn. & Westmoreland gas coal, Pa. RR.	15,586	536,710
*Pennsylvania RR	9,369	332,785
Kanawha Region, W. Va.		
Chesapeake and Ohio RR	4 886	140,576

* To Oct. 7.

The Production of Coke for the week ending Oct. 7.

Tons of 2000 lb.	Week. Tons.	Year. Tons.
Tyrone and Clearfield	..	273
Alleghany Region	..	53
West Penn. RR	870	39,065
Southwest Penn. RR	8,343	416,128
Penn. & Westmoreland Region, Penn. RR.	1,375	27,173
Pittsburgh, Penn. RR	2,280	81,822
Total	12,868	564,514

The receipts at Port Richmond for the week were 70,000 tons, shipments 75,000 tons, and balance on hand 175,000 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch. and Cumberland and Pennsylvania Railroads amounts to 60,540 tons.

Receipts of Coal at Boston, for week ending Oct. 15, and years from September 1st, 1874 and 1875.

From	Week. Tons.	1875. Tons.	1874. Tons.
Alexandria and Georgetown	2,770	20,732	31,006
Philadelphia	10,919	128,421	99,207
Baltimore	2,260	25,920	35,516
Other places	8,494	54,097	49,327
Great Britain	100	604	915
Nova Scotia	1,976	6,671	10,094

Shipments from Pictou, N. S., for the week ending Oct. 9:

	Tons. Week.	Year.
To United States	—	21,134
" West Indies	279	1,897
" South America	3,250	4,672
" Canada	3,295	123 455
" Other Provinces	499	50.703
	7,323	201,861

Belvidere Delaware RR. report:

	Week.	Year 1875.	Year 1874.
Receipts of coal at Coal Port (Trenton)	9 528	132,235	226,015
" " " South Amboy	8,399	190.125	499,335
Shipments of Coal Port (Trenton)	8,695	128,118	225,893
" South Amboy	14.330	254,781	507,748

Shipments from Block House, Cow Bay, C. B., to the following destinations, from Oct. 1 to Oct. 9, 1875:

	Week.	Year.
Provinces	258	6,730
West Indies	480	1,286
United States	542	9,293
	1,280	17,309

COAL TRADE REVIEW.

Duties.

Anthracite free, *Bituminous*, per ton of 28 bushels, 80 lb. to the bushel, 75c., gold.

All *slack*, or *culm*, such as will pass through a half-inch screen, per ton of 28 bushels, 80 lb. per bushel, 40c. gold.

Not otherwise provided for, per ton, 40c. gold.

NEW YORK, Friday Evening, Oct. 22, 1875.

Anthracite.

There is a good demand for stove coal reported by all the companies, and some find an equally ready market for chestnut and egg sizes, although the latter is generally quiet. Broken and lump sizes are reported by all as being very dull.

Prices.—The most important item of news in the coal trade this week is the decision arrived at by the Combination on the 20th inst., that the present prices of anthracite will be maintained without alteration until the 1st of March 1876. This announcement will have the effect of lessening the present demand in New York and Philadelphia, where supplies can be easily secured all winter, and as prices are to be no higher, and stock or condemned coal may be put on the market later in the season, or some other means be adopted to offer buyers concessions, it is very likely that many will only carry such stocks as will meet the current necessities. A number of Eastern buyers have delayed placing orders, in anticipation, as was generally supposed, that after November prices would be reduced monthly until they approximated the opening prices of next season, on March 1st. As freights are very low for this season of the year, it is probable that those who have delayed making purchases will now come forward and secure a winter's stock, as an increase in freights appears inevitable as the season advances. There is some prospect of the Pennsylvania Coal Company reducing the price of its coal in December, as it usually does, in order to dispose of its full out-put, but this reduction benefits contractors rather than the public, so that it is of little consequence. The Combination Companies will endeavor to keep their mines running during the winter, by curtailing the out-put to the actual demands from consumers. With the view of keeping all their men employed during the winter, the Lehigh and Wilkes-Barre Coal Company have already put them on three-quarter time.

The Production of anthracite coal for the week ending October 16, was 546,639 tons, and from January 1, 14,769,353 tons. The production for the corresponding week of 1874 was 512,777 tons, and from January 1, 1874, 15,526,038 tons. The production for the week ending October 9, 1875, was 532,010 tons. From the above figures it will be seen that there was an increase in the production of last week, as compared with the previous week, of 14,629 tons, and of 33,862 tons, as compared with the corresponding week of 1874. There has been a decrease since January 1, as compared with the corresponding period of 1874, of 756,685 tons.

Bituminous.

The demand for Cumberland coal has very much decreased, and the output has been lessened accordingly. Prices remain without notable change. The Clearfield companies continue to do a very good business, and say that there are good indications ahead. The prices of Central Pennsylvania coals are unchanged, and the output of coal very liberal. The Barclay, Broad Top, Snow Shoe, Clearfield and Allegheny regions show a total increase this year, as compared with 1874, of about 300,000 tons, or a gain of over 26 per cent. The Clearfield region shows a gain of 40 per cent., and the Barclay region 22 per cent. The Chesapeake and Ohio RR. shows an increase of 38 per cent. in its shipments to October 16, as compared with the shipments during the corresponding period of 1874. These increases, in the aggregate, do not make a very large item, but when we consider the depression which has existed in industries that consume this coal in large quantities, for steam and other purposes, it is safe to predict that the bituminous companies will, when business revives, hold a very important portion of the manufacturing trade of the Atlantic coast, especially as the advantages of these coals have been more generally made known during the past year, than at any previous time.

Foreign and Gas Coals.—The condition of the market for these coals continues as dull as it has been for a long time. A cargo of Scotch coking coal was offered on the market during the past week, but the price asked was so high that it did not attract buyers. It is now withdrawn, and about to be placed in the yard of the gas company to whom it was consigned.

Freights.

Freights from here to Boston are much easier than a week ago, vessels being in fair supply at $1 30 per ton. From Baltimore and Georgetown they are more firm, $1 75@$1 80 being the prices paid at present. At Philadelphia rates are well maintained, $1 70 still being paid to Boston.

Philadelphia Coal Trade.

PHILADELPHIA, Oct. 21, 1875.

The trade continues fairly active for domestic sizes, but the accumulation of coal at storing places still goes on. When all the places are full a large curtailment or total stoppage will probably be engineered, and the companies will, it is supposed, put down the prices in order to get rid of their accumulated stocks. The dealers are beginning to understand the programme, and can no more be stirred up to fill themselves up by rumors of strikes or suspensions, knowing from sad experience what is the result to them of filling their yards at full prices. They will take their chances, preferring to do no business to doing it at a loss. Newspapers are already sounding the alarm about a reduction of shipments to take place in November, and a total stoppage in the middle of December. Orders for shipment are not as plenty as they were.

Freights remain the same as the last quotations, although vessels continue scarce.

Wholesale Prices of Anthracite Coal for Nov. f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
*Lackawanna and Scranton at Rondout and Hoboken	5 05	5 15	5 25	5 65	6 10	4 95
‡Pittston at Newburgh	5 05	5 05	5 15	5 40	5 90	4 85
Wilkesbarre at Port Johnston	5 05	5 15	5 25	5 65	6 10	4 95
Plymouth, R. A., *Net*	....	....	5 25	5 65	6 10	4 95
Susque. Coal Co. at Amboy W.A.	5 05	5 15	5 25	5 65	6 10	4 95
Kingston at Hoboken	5 05	5 15	5 25	5 65	6 10	4 95
Lehigh Coals.						
Old Company at Port Johnston	5 55	....	5 55	5 65	6 10	5 10
Old Company's Room Run "	5 55	....	5 55	5 65	6 10	5 10
§Sugar Loaf, Hobok. &Amb."	5 55	....	5 55	5 65	6 10	5 10
Lehigh Coal Exchange "	5 55	....	5 55	5 65	6 10	5 10
Honey Brook Lehigh	5 35	....	5 55	5 65	6 10	5 10
Spring Mt. C. Co. at Hoboken	....	....	....	....	....	....
Beaver Meadow at South Amboy	5 55	....	5 55	5 65	6 10	5 10
†**Schuylkill Coals at Port Richmond.**						
Schuylkill white ash	4 55	4 65	4 75	5 15	5 60	4 45
Schuylkill red ash	....	....	5 05	5 25	5 65	4 45
Shamokin white and red ash	....	....	....	5 40	5 80	4 50
Lorberry	....	....	5 90	5 90	5 90	4 65
Lykens Valley	....	....	6 50	6 50	6 50	5 50

Per ton.

Freight from Hoboken and Weehawken to New York ... 40c.
" " Elizabethport & Port Johnston to N. York. 45c.
" " South Amboy to New York ... 50c.

*Freight on Lackawanna coal from Rondout to New York, by

boats or barges of the D. and H. Canal Co. 50c. per ton, the expense of towing vessels from New York harbor to Rondout and back will be borne by the Company.

† Freight from Port Richmond to New York (free of discharging) 85c. per ton.

‡ Prices to the Trade.

§ By Canal at New York, Jersey City and Brooklyn, 30c additional alongside.

Schuylkill coal is delivered f.o.b. of boats in New York harbor at 50c. per ton additional to these rates.

Pittston coal is delivered to carts in New York or Brooklyn at 65 cents per ton in addition to the above rates.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$5 20	$6 50
" " at S. Amboy	6 00	6 50
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	..
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt	5 00	6 50
Despard, West Va.,	5 co	6 50
Murphy Run, West Va., at Baltimore	4 75	6 30
Fairmount, West Va., " "	4 75	6 50
Newburgh Orrel, Md. " "	4 75	6 50
Cannelton Cannel, W. Va., at Richmond.	9 50	11 oc
" Splint, " "	5 co	6 5c
Peytona Cannel, " "	9 30	11 50
Straitsville " at Sandusky, O	3 25	10 00

Foreign Gas Coals.

	Sterling.	Am. cur'cy,
Newcastle, at Newcastle-on-Tyne	10/6@12/9	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	47/	18 00@20 00
" Gas Cannel "	32/ 6d	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	5 50
Caledonia, at Port Caledonia	1 75	5 25
Glace Bay, at Glace Bay	1 80	5 50
Lingan, at Lingan Bay	75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Steam and House Coals.

Broad Top, at the mine, $1 25; at Amboy	4 75@5 00	5 25@5 50
Cumberland, at Georgetown and Alexandria, Va	4 00@4 25	5 25@5 50
Cumberland, at Baltimore	4 25@4 35	5 75@6 00
Clearfield and Allegheny, "Derby," "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, $1 00; at Greenwich, Phil	4 65	5 65

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove. Chestnut.
Pittston coal, in yard	$6 20	$6 40 $5 60
Lackawanna coal, delivered	6 75	7 co 6 25
Wilkes-Barre, "	7 00	7 25 6 75
Lehigh & Locust Mountain, del'd	7 00	7 50 6 50
Schuylkill Red Ash, del'd	7 00	7 50

The Cost of delivering Pittston coal ranges from 40 cts. to $1 per ton, according to distance from the yard.

Williamsburgh, N. Y.

Lackawanna Coal at Yard.

Stove	$6 40
Egg	5 90
Chestnut	5 40

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$23 00
Liverpool House Cannel " " "	25 00
American " " " "	16 00
American Orrel " " "	11 00
Red Bank Cannel " " "	14 00
Cumberland " " "	7 00

Baltimore, Md. Oct. 20, 1875.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth. White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$4 80	$4 65
Broken	5 46	5 31
Egg	5 77	5 62
Stove	6 02	5 87
Nut	4 90	4 87
Shamokin, (red or white ash), and "Boston," freeburning white ash,		
Egg	5 80	5 62
Stove	6 00	5 87
Lykens Valley, red ash,		
All sizes	6 30	9 12

From wharf or yard, wholesale, 50@75c. additional.

By retail, all kinds and sizes, per 2240 lb. $7 00@8 00.

BITUMINOUS.

George's Creek and Cumberland f. o. b. at Locust Point	4 15	4 50
West Virginia f. o. b. at Locust Point		5 50
Youghiogheny Gas, f. o. b. at Locust Point		5 50
Swanton Coal, George's Creek		4 40

Boston. Oct. 20, 1875.

Reported by our Special Correspondent.

CARGO PRICES TO TRADE.

Lingan coal	$ 5 20	Westmoreland and Penn.	6 85
Caledonia	5 00	Waverly Co. Youghiogh'y.	6 80
Pictou	5 60	Cannelton Cannel	11 60
Block House	5 20	Cumberland	5 80@ 6 00
Red Bank Cannel	9 00	Anthracite	6 50@ 7 25
Glace Bay	5 00	" retail	7 50@ 8 00
Sydney	6 25		

Buffalo, N. Y. Oct. 20, 1875.

Reported by our Special Correspondent.

Freights to Chicago and Milwaukee $1—with vessels scarce. Quotations are as follows:

ANTHRACITE.

	Afloat. f.o.b.	Retail, Deliv'd.
Grate	$6 40	$7 40
Egg	6 40	7 40
Stove	6 85	7 85
Nut	6 60	7 60

	Lump.	Run of Mine.	Nut.	Slack.	Nut & Slack.
Connellsville Coke	$5 50	....	....	....	....
Brookfield Coal	....	....	....	....	....
Briar Hill	4 50	....	....	....	3 00
Youghiogheny	4 75	....	....	....	....
Monterey	3 75	3 50	3 25	2 50	....
Catfish	3 75	3 50	3 25	2 50	....
Stoneboro	....	....	3 25	2 50	....
Sterling Cannel	5 50	....	....	....	....
Buffalo Coal Co.	3 50	3 25	....	2 30	....

Chicago, Ill. Oct. 18, 1875.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.

Retail prices per ton of 2000 lb. delivered to buyer.

No change in prices of anthracite coal.

		BITUMINOUS.	
Lehigh Lump	$10 00	Briar Hill and Erie	@ 7 00
Lehigh grate and egg	10 00	Walnut Hill, Pa	@ 6 00
Lehigh stove and chest.	10 50	Midway, Pa	@ 6 00
Lackawanna, Wilkes-Barre and Pittston*		Cannel	@ 9 00
Grate and egg	9 00	Blossburg	8 00
Stove and chestnut	9 50	Indiana Block	5 50
		Hocking "Brooks"	6 00
		Wilmington and Illinois	4 50

* 50 cents off these prices for car load lots to country dealers and manufacturers.

Cincinnati, O. Oct. 18, 1875.

Reported by our Special Correspondents.

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	10 c.	——
Pomeroy coal	8 c.	——
Kanawha "	10 c.	——
Cannel coal, according to quality	—	——
Semi-Cannel	—	——
The following are the retail prices delivered		
Youghiogheny	15@16c.	$4 25
Pomeroy	11c.	3 00
Cannel	—c.	....
Kanawha Semi-Cannel	13c.	3 60
Anthracite		9 50@11 00
Foundry coke	10c.	——
Coke, hard and soft	12c.	——

Cleveland O. Oct. 18, 1875.

Specially reported by Messrs. WARNER, BATES & Co.

WHOLESALE.

Per ton of 2000 lb. f. o. b. vessels.

	For vessels,	On cars.
Youghiogheny Gas Coal	$4 40	$4 15
Cannel	4 50	4 15
Blossburgh	5 00	5 00
Briar Hill Block Coal	3 80	3 60
Hocking Valley	3 25	3 10
Straitsville Coal Co., lower vein	3 25	3 10
Mineral Ridge	3 10	3 25
Massillon	3 10	3 30
Tuscarawas Valley	2 85	2 70
Columbiana	2 80	2 60

RETAIL DELIVERED.

	Lump.	Nut.
Briar Hill	$5 00	$3 50
Massillon	4 50	4 00
Mineral Ridge	4 50	4 00
Columbiana	3 25	3 00
Stillwater	3 25	3 00
Tuscarawas Valley	3 25	3 00

ANTHRACITE DELIVERED.

Grate.	Egg.	Stove.	Chestnut.
Lehigh $9 00	$9 00	$9 50	$9 25
Wilkes-Barre 7 85	7 85	8 35	8 10
Lackawanna 7 85	7 85	8 35	8 10

—*Manufacturing and Trade Review.*

Detroit, Mich. Oct. 16, 1875.

Specially reported by Messrs. ROBINSON & KEYS, Dealers in all kinds of coal.

Per ton of 2000 lb.

Lehigh Lump, per ton	$10 50	Blossburg	8 50
Lehigh " prep.sizes.	10 00	Briar Hill	7 50
Wilkes-Barre, Grate and Egg	9 00	Willow Bank	7 00
Wilkes-Barre, Stove and Nut	9 50	Erie	7 50
		Massillon	7 00

Erie, Pa. Oct. 16, 1875.

Reported by our Special Correspondent.

Wholesale, per ton of 2000 lb. Bituminous f. o. b.

Briar Hill lump	$3 75	Beaver lump	$3 50
Midway	3 25	Cat Fish	3 00

Indianapolis, Ind. Oct. 16, 1875.

Specially reported by Messrs. COBB & BRANHAM

Prices unchanged.

Wholesale on board cars, and retail delivered to consumers.

Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

Indian Creek, per ton	$2 75	Peytona cannel, per ton.	7 00
White River, "	2 75	Indiana Cannel	6 50
Brazil Block, "	2 65	Hocking Valley	4 25
Highland, grate, "	2 25	Youghiogheny	4 75
Block coal, nut, per car.	18 00	Blossburg (smithing)	6 50
Highland " "	18 00	Piedmont "	6 50
Block Slack "	17 00	Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$9 95	Nut	9 80
Egg	9 95	Stove	10 25

Owing to the Miner's strike there is no Lehigh coal in this market.

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	14	" Slack, "	
Brazil Block	14	Peytona Cannel	6
Highland grate	14	Indiana "	24
Block Nut, domestic use.	12	Youghiogheny	20
Highland Nut, " "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$10 per ton.
Lehigh, retail	$11 50 per ton.

Louisville, Ky. Oct. 16, 1875.

Specially reported by Messrs. BYRNE & SPEED.

WHOLESALE.

	per bushel		per bushel
Pittsburgh	10c	Pine Hill	—
Raymond City	9c.	Kentucky	—

RETAIL.

	per bushel		per bushel
Pittsburgh	14c.	Peytona Cannel	20@22c.
Raymond City	13c.	Buckeye "	—
Pine Hill	13c.	City-made Coke	11c.
Kentucky	12c.	Anth., per ton, $10 00 to 10 50	
Screened Pittsburgh per load			$3 00
Screened Raymond City			2 75
Pine Hill (Kentucky)			2 75
Cannel			$5 to 5 50

Milwaukee, Wis. Oct. 16, 1875.

Specially reported by Messrs. R. P. ELMORE & Co.

Retail price per ton of 2000 lb.

Lehigh Lump	$10 02	Briar Hill, select	$8 00
Lehigh Prepared	11 00	Blossburg	8 00
Lackawanna (all sizes)	10 02	Cannel	8 00
Pittston	10 00	Pittsburgh	7 00
Scranton	10 00	Steam coal	5 00

New Orleans, La. Oct. 16, 1875.

Specially reported by Messrs. P. & R. DE VERGES, Wholesale and Retail Dealers in Pittsburgh, Anthracite, Cannel and other Coals.

We have a dull market to report, with a large supply on hand. Stock, October 1st, 184 boats 5 barges; consumption during September, 19 boats, 2 barges. No arrivals.

Pittsburgh coal, retail, per bbl	60c.
" wholesale	35c.
" steamboats, per box	50c.
" to manufacturers, per bbl	55c.
" shipments, per hhd	$6 00
Anthracite, wholesale, per ton	9 50
" retail, "	12 50
Virginia Cannel, per bbl	80c.
Scotch " "	....
Mt. Carbon, wholesale, per bbl	...
" " retail, "	....
St. Bernard, wholesale, per bbl	....
" retail, "	....

Pittsburgh, Pa. Oct. 21, 1875.

COAL.—Trade, from all that we can learn, remains substantially as noted at the date of our last report; there are no new features deserving of special notice. It was thought, at one time last week, that there would be sufficient water to let barges out, but such was not the case; a couple of light tows were taken out, but that was all. However, it is all the better for those having stock in the down river markets, as it by keeping down the supply it will enable them to keep up prices, and very likely to put them still higher. The railroad trade is still reported unsatisfactory, as prices are unremunerative, and also the demand; we continue to quote lump coal at 5½ @6c. per bushel, delivered free on cars in Pittsburgh and about one cent additional for nut. The consumption of anthracite coal is steadily increasing here.

COKE.—Nine-tenths of all the coke ovens in the coke region are now in operation, and all the coke manufactured is being shipped, finding a market from the Atlantic to the Pacific. Recently there have been orders received from New Britain, Conn. All that is needed to bring Connellsville coke into general use in that section is a rate from the railroads that will enable them to get it to compete with the anthracite coal. The writer was but a few weeks ago on a visit to Buffalo, and in making inquiry he found that the furnaces there were using it with great satisfaction, and to some profit. They claim it will make their furnaces produce more iron and of a better quality by using one-third coke and balance anthracite than to use all anthracite. The low price of coke has introduced it into every city and village from here to Colorado where there is a blast-furnace or foundry. The great hindrance to more of it being used is the fact that the railroads are charging over $50 per car to Chicago, while they bring grain from Chicago to New York for less than that, and would have to bring most of their cars back to Chicago empty if not for the coke business; there are from 250 to 300 cars per day going West.—*American Manufacturer.*

Richmond, Va. Oct. 16, 1875.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$12 00	New River Bituminous,	$4 50
" semi-Cannel	4 75	Clover Hill Coal	4 25
Coalburgh Splint	4 90	James River Bitum	3 30
Lewiston "	4 90	" " Carbonite,	5 80
Kanawha Gas coal	4 50		

San Francisco.

From the *Commercial Herald*, Oct. 7, 1875.

Imports from January 1st to Sept. 16:

Anthracite tons	7,667	English, tons	38,001
Australian, tons	90,317	Vancouver Island, tons	46,075
Coos Bay, tons	25,672	Rocky Mountain, tons	42
Cumberland, tons	6,703	Seattle, tons	47,515
Mt. Diablo, tons (8 mos)	99,356	Bellingham Bay, tons	8,545

Supplies from all quarters continue to pour in upon us with considerable volume. The receipts for the week embrace the following: from Seattle, 475 tons, per *Harrison*; from Newcastle, N. S. W., per *Killochan*, 1,624 tons; from Sydney, 800 tons coal, and 300 tons shale; from Wellington, B. C., per *Washington Libby*, 1,500 tons; per *Messenger*, from Hongkong, 200 tons anthracite; 400 tons from New York, per *Robert Dizon*. The receipts from Vancouver's Island, Seattle and other North Coast mines are steadily increasing, and it is by reason of these free supplies from British Columbia, Coos Bay, Bellingham Bay and Seattle mines that the price of Australian is forced down so low as at this date. It is quite a difficult matter to quote cargo sales at present correctly, as nearly all large transactions are at a loss—price s

withheld. Anthracite continues scarce and high. We quote Bellingham Bay at $8 50; Coos Bay, $10; California Mt. Diablo Steam, $6 25@8 25, for fine and coarse respectively; Cumberland, $16@18; Nanaimo, $9 50@10; Seattle, $9 25@10; Anthracite, $15@18. Lehigh jobbing at $25@28. The Br. ship *Carmarthon Castle*, from Newcastle, N. S. W., has 1,908 tons; *Eric the Red*, from Liverpool, 1,188 tons.

Toledo, Ohio. Oct. 20, 1875.

Specially reported by Messrs. GOSLINE & BARBOUR.

Per ton of 2000 lb. on cars.

Hocking Valley	$3 40	Massillon	4 20
Straitsville	3 40	Youghiogheny	5 00
Shawnee	3 40	Blossburg	7 00@7 50
" nut	2 90	Cumberland	7 00@7 50
r Hill	5 50	Connellsville coke	7 00

ANTHRACITE.

Grate, screened	$7 50	Stove, screened	$7 75
Egg, "	7 50	Chestnut "	7 50
Lehigh Lump	9 00		

40 cents to $1 per ton additional for delivery at retail.

Halifax, N. S. Oct. 16, 1875.

Prices per ton of 2240 lb. in gold.

Sydney (old mines)	$4 00	Little Glace Bay	3 35
Gowrie	3 35	Blockhouse	3 35
Victoria		Albion (at Railroad)	4 00

Montreal. Oct. 16, 1875.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

After a season of almost unprecedented dullness in the coal trade, a sudden reaction has taken place. Imports of anthracite to date are 81,841 net tons, against 97,912 tons last year, in the same period, showing a deficit of over 16,000 tons. A large demand has therefore arisen and prices are expected to rule high this winter.

In bituminous coal there is more firmness, and stocks for the winter are believed to be not excessive. The great depression of manufacturing interests has greatly diminished the consumption of coal for steam purposes, and no great demand is anticipated, unless trade revives greatly. We quote:

Wholesale per ton of 2240 lb.

Scotch Steam	$5 00	Cape Breton Steam	$4 25
Pictou "	4 85	Newcastle Smiths	6 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$7 50	Chestnut	7 25
Stove	8 00		

Toronto, Ont. Oct. 16, 1875.

The following are present retail prices for coal:

Per ton all sizes.

Lackawanna and Scranton	$7 00
Lehigh Lump and prepared	8 00
Blossburgh	6 50
Soft lump for grates	6 00
Soft nut	4 50

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.‡
To ‡ Newark, N. J., via Central Railroad of New Jersey	2 60	2 46	2 93	2 93	3 16
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	..	56	47	71
‡ Philipsburg, N. J.	99	85	1 32	1 32	1 65
Elizabethp't, Port Johnston, Hoboken and South Amboy, N. J., shipping and wharfage 35c. add.	2 24	2 10	2 59	2 57	2 80
High Bridge, N. J.	2 40	1 95	2 80	2 54	2 72
Somerville and Raritan, N. J.	2 80	2 35	3 20	2 35	3 12
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	2 60	2 46	2 95	2 93	3 16
¶ Jersey City, N. J., and New York, via L. V. RR. and Morris Canal	2 85	2 40	3 17	3 24	3 54
Andover, via Delaware, Lackawanna and Western RR	3 30	3 10	3 70	3 69	3 99
Trenton, Somerset Junction and Greensburg, via P. RR. Belvidere Division	2 65	2 45	3 05	3 04	3 34
Trenton, for shipment, including shipping and wharfage	12 11	1 95	2 45	2 46	2 76

From *Mauch Chunk* to *New York* (towing limits) and Jersey City† via Lehigh Valley RR. and Morris Canal .. $2 37

From *Mauch Chunk* to *Philadelphia* via L. V. RR. and North Penn. RR 1 75

††From *Phillipsburg, N. J.* to *Hoboken* for shipment via Delaware Lackawanna and Western RR., Morris and Essex Division 1 24

From *Lackawanna Junction* to **Auburn, N. Y.*, for shipment, via Southern Central R R. in connection with Pa. and N. Y. R.R. 2 53

From *Lackawanna Junction* to ‖*Weedsport* for *Rochester and Charlotte* 2 59

From *Lackawanna Junction* to *Sterling* for *Oswego, N. Y.*.. 2 62

‖ To this point for all places between Rochester and Buffalo the rate is 2 53

* The rate to this point for Syracuse is 2 05

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

¶ 20 cents per ton additional for transferring coal from boat to boat, and 30 cents per ton for reshipment of same from wharves.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

†† The rate for consumption to this point is $1 80.

CANAL TOLLS, exclusive of towage, Bordentown to New Brunswick, when towed by the Company's Steam Tugs:

For Anthracite Coal ..... 35c.
Bituminous and Semi-bituminous Coal... 35c.

Freights.

Per ton of 2240 lb.

Representing the latest actual charters up to Oct. 22, 1875.

PORTS.	From Philadelphia.	From Baltimore and Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	2 25	....
Albany	*85	1 70	....
Amesbury, Mass	....	....	....
Bangor, Me	†2 00	2 00	1 30
Bath, Me	1 60	1 70	1 30
Baltimore	....	....	....
Boston, Mass	§1 70	1 75@1 80	130
Bridgeport, Ct	*85	1 50	80
Bristol, R. I.	....	....	90
Cambridgeport, Mass	§1 50@1 60	....	1 30
Derby	....	1 60	....
Dighton	....	1 65	....
East Cambridge	1 60§	....	§1 30
Fall River	1 30@1 35	1 50	90
Hackensack	....	....	....
Hallowell, Me	....	....	....
Hartford	1 75	2 00	1 25
Hoboken	†85	1 30	40
Hudson	....	1 65	....
Jersey City	....	1 30	40
Lynn, Mass	†1 85	....	†1 30
Middletown	....	....	1 00
Mystic	....	....	....
Newark	....	....	....
New Bedford	1 35	1 50	90
Newburyport	1 65	1 80	1 45
New Haven	*85	1 50@1 55	90
New London	1 45	1 50	85
Newport	1 35	1 45	90
New York	85†	‖1 40	40
Norfolk, Va	85	60	....
Norwalk	1 35‡	1 50	80
Norwich	1 35‡	1 65	90
Pawtucket	1 50‡	1 65	‡100
Philadelphia	....	80	....
Portland	1 60	1 70	1 30
Portsmouth, N. H.	1 70	1 80	1 45
Providence	1 45	1 50	90
Petersburg, Va	....	90	....
Portsmouth, Va	....	....	....
Poughkeepsie, N. Y.	*85	1 50	....
Richmond, Va	95	70	....
Rockport	....	....	....
Saco	2 00	....	....
Sag Harbor	....	....	1 00
Salem, Mass	1 65	1 70	1 30
Salisbury Pt., Mass	....	....	1 50
Savannah, Ga	....	1 50	....
Stamford	*85	....	90
Stonington	....	....	....
Taunton	..	..	1 30
Trenton, N. J.	....	....	....
Troy	....	....	....
Warren, R. I.	....	....	90
Washington, D. C.	1 00@1 05	....	....
Wareham	....	1 65	....
Weymouth	....	1 80	....
Wilmington, Del	....	85	....
Wilmington, N. C.	....	1 50	....

* And discharging and towing. † And discharging.
‡ And towing. § 3c. per bridge extra.
‖ The rate to this point by barge is $1 65.

From Philadelphia to all places on the Hudson River the rate is 85c., and discharging and towage according to destination.

The Geneva, Ithaca and Athens Railroad Co.

Coal Tariff takes effect September 1st, 1875.

Rates from *State Line*, on a consignment of coal of not less than 25 tons of 2240 lb. will be as follows:

To *Ithaca* (local), 75c.; to *Geneva* (local), $1 50; to *Geneva* or *Cayuga* for *Buffalo* and *Tonawanda*, 90c.; *Geneva* or *Cayuga* for *Rochester* and *Charlotte*, $1 18; *Geneva* or *Cayuga* for *Phelps Junction*, for S. P. S. and L. O. S. R. R.'s, 92c.; *Geneva* or *Cayuga* for all other points on N. Y. C. R. R., $1 18

Rate from *Lackawanna Junction* to *State Line* on coal for all points on the G. I. & A. (excepting *Geneva*), and C. L. R. R's., $2; *Ithaca* (shipment), $1 41; for *Geneva*, $1 41. For all other points on the N. Y. C. & H. R. R. R., $1 41.

Rate from *State Line* to *Van Ettenville* for all points on the Horseheads Division of the U. I. & E. R. R., 34c. Rate from *Van Ettenville* to any *point* on said Division, 33c.

Rate from *State Line* to *Ithaca*, for *Buffalo*, *Rochester*, *Syracuse*, and all other points via Erie Canal, 55c.

Rate L. & B *Junction* to f. o. b. boats at *Ithaca* for *Buffalo*, or other Canal points, $2 06 per gross ton.

Rate L. & B. *Junction* to *Buffalo*, *Black Rock*, *Susp. Bridge*, (via *Geneva*), all rail $3 97 per gross ton.

Rate L. & B. *Junction* to *Rochester*, all rail $3 44 per gross ton.

Canal freights, *Ithaca* to *Buffalo*, $1 10 net ton; to Rochester, 75c. (subject to change).

Freight on Nova Scotia Coals.

Pictou, Nova Scotia, to	New York		$1 80
" " "	Portland, Me		2 00
" " "	Montreal, Canada		2 35
" " "	Quebec. "		1 80
" " "	Halifax, N. S.		1 25

Pilotage for vessels of from 80 to 150 tons, $6 inward and $4 outward. From 150 to 1000 tons, 1c to $17 inward and $6 to $12 outward. Vessels of 1000 tons and upwards, 2c. per ton inward and 1½c. per ton outward.

Towage 3c. per ton. Trimming 3 hatch vessels, 6c. per ton. Two hatch vessels 7c. per ton.

Delaware and Raritan Canal.

Tolls and Steam Towage.

Per 2240 lb. Cargoes to exceed 110 tons.

From Fairmount to New York, towing limits within 53d st.			74c.
" Greenwich	"	Bituminous	64c.
" "	"	Anthracite	69c.
" Lambertville	"	Anthracite	62c.
" Port Richmond	"		68c.
" " "	"	Semi-bituminous coal,	63c.
" Philadelphia	"	Cumberland "	58c.
" Trenton	"	Anthracite "	37c.

Towing.

From foot of 23d Street, East River, and *return*, *per ton*.

	cts.		cts.
Bridgeport, Conn	33⅓	New Haven and Norwalk, Conn	33⅓
Hartford and Stonington, Conn	75	New London, Conn	60
Norwich, Conn	68	*Derby, "	3 ½
Stamford, Conn., per boat	$75	Harlem, N. Y, per boat	$18
Whitestone, L. I	$30	Glen Cove, L. I	50

	cts.
Manhattanville, via Hudson River, per ton	8
Harverstraw and Peekskill, via Hudson River	16
West Point and Cold Spring " "	17
Rondout " "	23
Yonkers, boats of 100 tons capacity " per boat	$15
Sing Sing and Peekskill " " " "	20

* $50 per boat extra is charged for towage to this point.

Boats having less than 200 tons will be charged the same to Eastern points as if carrying that quantity.

THE BRITISH IRON AND METAL TRADES.

Messrs. Robert Crooks & Co.'s Circular.

LIVERPOOL, Oct. 7, 1875.

Pig Iron.—The warrant market kept advancing last month, until price reached 69/ 4½d. on the 29th. Since then the tone has been quieter, and business was done on Monday from 68/6d. to 67/6d.; on Tuesday, price ranged from 67/ 6d to 66/ 6d, and yesterday the market was flat, as low as 64/ 6d. being taken, closing with buyers at 64/ 9d., and sellers 65/. Furnaces in blast on 1st October, 116. The following prices of makers' iron are necessarily somewhat irregular. No. 1 Gartsherrie, 75/ 6d; Coltness, 80/; Summerlee, 69/; Monkland, 67/ 6d. f.o.b. Glasgow; Glengarnock, 71/; Eglinton, 66/, f.o.b. Ardrossan. Shipments against warrants on 2d inst., 10,870 tons, a nd stocks on 1st inst., 65,705 tons.

Finished Iron.—The demand for bars during the past month has been light, and makers have accepted a reduction of 5/ per ton for specifications of a favorable kind, though some have not sold under £8 2/ 6d. for Crown quality. The shipping demand is now almost at an end, and it seems probable that prices must gradually give way till they reach a low enough point to create confidence. Possibly, even now, good specifications might be placed at £7 17/ 6d. Hoops are in request, the cotton season having commenced, and for these prices will likely be maintained till the close of the year. Sheets are still in demand, large quantities being required by galvanizers, who are very fairly supplied with orders. Plates are very dull and can be bought low.

Canada Plates.—The season is now nearly over; a considerable quantity has been shipped during the month, according to our export returns, but we anticipate there will be found to be a substantial decrease in quantity, as compared with 1874, by the end of the present month. Prices are now nominal, and orders, we think, could be placed at lower figures.

Tin Plates.—Dullness has continued during the greater part of the month, but the last few days there has been a demand at the low prices ruling. Many makers have booked pretty largely, and are indisposed to sell further at present prices, which are 6d. to 1/ for charcoals, and 6d. to 9d. for cokes higher than figures quoted a fortnight since, except for immediate delivery. Some, who are full for immediate delivery, will not quote at all, evidently believing in a substantial advance. We quote charcoal tins, E.C.C., 26/; R.G., 25/ 9d.; Wilden, 27/; Ynis, 25/; Siluria, 25/; P.N., 25/; ternes, R.G., 23/ 6d.; S.T.P., Dean, Allaway, 23/; coke tins: Asyami; 21/ 6d.; Dunvant, 21/ 6d.; Gelly, 21/ 6d.; Oldcastle, 23/; Deri, 21/ 6d.; Flint, 21/. Ternes, 1/ to 1/ 6d. less.

Tin.—English has remained steady throughout the past month, price for L. & F. ingots keeping about £89 per ton. Demand has been only comparatively moderate, as prices which have been required by smelters were somewhat beyond its intrinsic value. Straits rather quieter, but steady at £85 10/ to £86 per ton.

Copper.—During September, very little alteration has taken place in this article, price for tough ingots only varying from £88 to £89 per ton. The market closes firmer at the latter figure, but very little business is being done, pending the advice of charters from Chili.

Lead.—The price quoted in our last monthly circular has been maintained, but the market is now much quieter, and orders being scarce, probably lower figures would be accepted.

Freight to Quebec and Montreal was 7/ 6d. last week, through the combination breaking, but the rate has again been fixed, and 22/ to 22/ 6d. is asked for this month. To the States there is no change.

IRON MARKET REVIEW.

Import Duties.

The following are the duties in Gold:

Flat Iron, not less than 1, nor more than 6 inches wide, nor less than ¾, nor more than 2 inches thick. *Round Iron*, not less than ¾, nor more than 2 inches in diameter, and *Square Iron*, not less than ½, nor more than 2 inches square per pound 1 c.

Flat, Round or Square Iron, of larger or smaller sizes than the above mentioned, per lb ..... 1½c.

Provided, that all iron in slabs, blooms, loops, or other forms, less finished than bars, and more advanced than pig iron, except castings, shall pay the same as iron in bars.

Provided, that none of the above iron shall pay less than 35 per cent.

Railroad Bars—Iron ..... 70c. per 100 lb.
Railroad Bars—Steel ..... $1.25 per 100 lb.
Boiler plates, or other plate iron not less than 3-16 of an inch thick, per lb ..... 1½c.
Scrap Castings per ton $6 00
" *wrought* " " 8 00
Pig Iron per ton 7 00
Iron ore 20 per cent. *ad valorem*.
Antimony, crude or regulus, 10 per cent.
Copper Ore—On all fine contained therein, 3c. per lb.
Old Copper, fit for manufacture only, 4c. per lb.
Copper, pigs, bars, ingots or plates, 5c. per lb.
" sheets, bolts, nails, spikes, rods, pipes, &c., 45 per cent
Tin, in bars, blocks or pigs, and grain tin, free.
Tin Plates, or sheet, and terne or taggers tin, 1 1-10c. per lb.
Lead—Bars or pigs, 2c. per lb. Old lead, for manufacture only, 1¼c. per lb. Pipes, shot and sheets, 2¾c. per lb.
Zinc, in blocks or pigs, 1¼c. per lb.; in sheets, 2¼c. per lb.; manufactures of, 35 per cent.
Quicksilver free.

New York.

FRIDAY EVENING, Oct. 22, 1875.

American Pig.—The demand for this article shows no improvement, nor are there any indications that it will be much, if any, better this year. There has been a constant quiet underselling going on among several of the makers until the Thomas Iron Company, finding that their customers were being tempted, have this day resolved to openly quote at $24 for No. 1 foundry, and $22 for No. 2 They do not quote forge iron, being already sold ahead. This action on their part is not likely to secure them new trade, but they hope to maintain that which they have already established, a trade which they have held heretofore, and which they are likely now to hold by promptly accepting the situation. The failures of Messrs. MOSELY, HODGMAN & Co., of Boston, and Messrs. ROGERS & BUECHFIELD, of Pittsburgh, are announced, and tend to add to the general distrust as to the financial standing of many in the trade, both dealers, consumers and makers. The failure of the first-mentioned firm is said to have fallen heavily on some of the Lehigh companies. We note sales of about 600 tons of Thomas iron on the basis of $25 for No. 1; 50 tons of No. 1 North River iron at $25; 50 tons of No. 1 Lehigh at $25; and 100 tons of Crane at $25, less 4 per cent., regular time, delivered at Hoboken.

Scotch Pig.—We note sales of about 100 tons in a small way at $33 for Coltness; $31 50@32 for Summerlee; $29 50@30 for Eglinton. The demand is as light as it has been at any time this year. Prices in Glasgow are reported by cable as being weaker. Our latest mail bringing us Glasgow correspondence bearing date of the 8th inst., reports a further large increase in stocks in CONNAL & Co's stores. The total stock at that date was 73,529 tons.

Rails.—There are prospects of early business in new rails but none is reported as having taken place during the past week. We quote iron, at mills, at $45@50, and steel at $70. We are reported a late sale of a quantity of iron rails delivered at Philadelphia, at a price equal to $43 at the works.

Old Rails.—There are some inquiries in the market but buyers' and sellers' views differ. We quote nominally at $26@26 50.

Scrap.—We are reported no sales as having taken place since our last, although we learn of several inquiries in the market. In the absence of business we quote nominally at $31@32 50.

Philadelphia, Pa.

Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE COX & Co., Iron Merchants, 333 Walnut street, Philadelphia. Week ending October 22, 1875.

American Pig.—The market continues about as at our last. Small sales at quoted prices, all conceding that prices have about touched bottom for the present, and nothing but a short demand would advance, or much less demand would reduce them below, the present very low price. The pipe foundries continue busy, and are in the market this week for large lots, but at very low prices. We quote No. 1 $25; No. 2 $23.

Mill Irons are about as last week, dull of sale, at $22 to $24.

Bar Iron dull of sale at 2.5-10c.

Rails.—New rails are quoted $45@$50. No sales reported this week.

Old Rails are quoted $25@$27.

Muck Bars are quoted $41@$43.

Scrap is quoted $28@32. We quote sales of 500 tons Montgomery; 100 tons Chickies: 100 tons St. Charles; 1,200 tons Cram, all at quotations.

Baltimore. Oct. 20, 1875.

Specially reported by Messrs. R. C. HOFFMAN & Co.

We have no change to note in the iron market since our last report. The same depression and dullness exist as heretofore. We quote:

Baltimore Charcoal	$32@35	Anthracite No. 3	$21@22
Virginia Charcoal	31@34	Mottled and White	15@21
Anthracite No. 1	25@26	Charcoal C. B. Blooms,	72@75
" No. 2	23@24	Refined Blooms	60@65

Boston. Oct. 21, 1875.

Specially reported by E. P. CUTLER & Co.

We have to report a continued small demand for both pig and bar iron. Prices for job lots remain the same as for weeks past.

There is but little doing in scrap or old rails.

PIG is moving in trifling lots rather more generously than for two weeks, but the prices seem to hang close to our inside quotations, and in cash instances 50c. to $1 under on No. 1. Two leading sellers have ceased to name quotations, and, although not out of the market, are not quotably upon the market, but are understood to be looking to a business which shall appreciate good brands No. 1 at $28 to $29 on board car. The failure of a leading firm, however, has not as yet precipitated any stock on the market. We quote nominally No. 1, $28@$30; No. 2, $24@$26; and gray forge, $21@$24.

BAR has had a fair jobbing business, with prices on warranted iron steady at $57 50. In fact, the market shows a little better tone this week, one or two large dealers refusing to sell for less than $58 cash. Common iron is nominally dead. The little business doing goes in one brand, and runs from $51 to $53, the best known and more popular securing the higher price.

STEEL has had a quiet week, tool makers and sleigh smiths being the only business. Prices are firm on foreign and American. We quote American tool, 14c.@15c.; American Machinery, 9c.@9½c.; Bessemer tires, 7c.@7½c.; Sweet's Excelsior tire, 8½c.@12c.; English tool, 16c.@18c. gold.

COPPER has been stiffened up by the hydraulics of the Calumet-Hecla party, notwithstanding the manufacturers' meeting in Boston on Wednesday; they agreeing to stand out of the market, and to buy in old metals the major portion of their supplies. The sheathing-metal men and brass founders will shut down almost wholly during the next six weeks, and altogether the use of ingot will go on in the most economical way. The issue has resolved itself into a question of the strength of the copper speculators and the consumers. There is nothing offering for futures, spots quoting at 23¾ firm For manufacturers we quote new sheathing, 30c.; bolts and braziers, 31c.; yellow metal bolts, 20c.@29c.

LEAD is a little firmer at the decline last noticed, and business is a trifle better. We quote pig 5½c. for domestic and 6¼@6½c. for foreign; sheet and pipe lead, 9c. currency; tin-lined pipe, 16½c.; bar lead, 9c., less usual trade or 10 per cent. discount

ANTIMONY is firm, with very little business, quoting from 13½c.@13½c., as to lots bought.

SPELTER is strong and dull at $7 55, 30 days, and $7 40 prompt cash, all currency. Silesian is having a trivial business at $7 30.

TIN is steadier and a trifle buoyant, without, as yet, any farther advance being established. We quote Straits 20c.; Banca, 24c.; Refined English, 19½c @20c. gold. Plates are active; we quote charcoal I. C., $7 25@$7 75; coke, $6 50@$6 75; and terne at $6 15@$6 50, gold.—*Commercial Bulletin.*

Chicago. Oct. 18, 1875.

Specially reported by Messrs. ROGERS & Co., dealers in Scotch and American pig iron.

No. 1 Coltness	$40 00@	....	
No. 1 Gartsherrie	40 00@	....	
No. 1 Summerlee	38 00@	....	
No. 1 Glengarnock	37 00@	....	
No. 1 Eglinton	36 00@	....	
Warner's "American Scotch"	34 00@	....	
Massilon No. 1 Foundry	31 00@	....	
No. 1 Grand Tower Mo. ores (Bituminous)	29 00@	....	
No. 2, " " "	28 00@	....	
No. 1 Mill	25 00@	....	
No. 1 Foundry, Ohio	28 00@	....	
No. 2 " "	27 00@	....	
No. 1 Hanging Rock (charcoal)	30 00@	....	
No. 2 " "	24 00@	....	
Union "A" 1 (Anthracite)	28 00@	....	
Union "B" 2 (Anthracite)	26 00@	....	
No. 1 Lake Superior (charcoal)	30 00@	....	
No. 2 Lake Superior "	28 00@	....	
No. 3 Lake Superior "	30 00@	....	
No. 4 Lake Superior "	32 00@	....	
Bessemer Steel Rails	72 00@	....	
New Iron Rails	50 00@	....	
Old Rails	28 00@	....	

Cincinnati. Oct. 19, 1875.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Below please find closing quotations of our pig iron market, viz:

CHARCOAL.

Hanging Rock,	No. 1 Foundry	$26 00@	....	—4 mos
"	No 2, "	24 00@25	00	—4 mos
"	Mill	22 00@23	00	—4 mos
Tennessee	No. 1, Foundry	23 00@24	00	—4 mos
Tennessee,	No. 2, "	22 00@23	00	—4 mos
"	Mill	22 00@	....	—4 mos
Missouri,	No. 1, Foundry	.... @	....	—4 mos

STONE COAL.

Ohio,	No. 1, Foundry	23 00@24	00	—4 mos
"	No. 2, "	22 00@23	00	—4 mos
Ohio Mill		21 00@22	00	—4 mos
Missouri,	No. 1 Foundry	27 00@28	00	—4 mos
"	No. 2, "	26 00@27	00	—4 mos
"	Mill	26 00@27	00	—4 mos

CAR WHEELS.

Hanging Rock, C. B		40 00@50	00	—4 mos
Tennessee	"	30 00@35	00	—4 mos
Missouri	"	35 00@40	00	—4 mos
Alabama	"	30 00@35	00	—4 mos

BLOOMS.

Charcoal		60 00@	80 00	—cash

SCRAP IRON.

Cast		50c.@	80	—cash
Wrought		1 00@1	35	—cash

Cleveland, Ohio, Oct. 20, 1875.

Messrs. C. E. BINGHAM & Co., quote as follows:

Per gross ton, on four month's time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal		31 00@	....	
No. 2, "		30 00@	....	
No. 1, Anthracite		28 00@	....	
No 2, "		26 00@	....	
No. 1, Bituminous foundry		27 50@	...	
No. 2, " "		26 00@	....	
American Scotch, No. 1, Cherry Valley		31 00@	....	
" " B—1, " "		28 50@	....	
" " No. 2, " "		27 50@	....	
No. 1, Massilon		30 50@	....	
B—1, "		28 00@	....	
No. 2, "		25 50@	...	

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal		30 00@	....	
No. 4 " " "		32 00@	....	
Nos. 5 and 6 " "		32 50@	...	

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal		30 50@	....	

FORGE IRON.

No. 1, Gray		24 50@	....	
White and Mottled		23 50@	...	

Indianapolis, Ind. Oct. 20, 1875.

Specially reported by NELSON KINGMAN, broker and dealer in pig iron, etc.

Trade very dull at prices named below.

New Rails at mill		$48 00@50	00	
Old Rails "		24 00@26	00	
Hanging Rock Charcoal Pig	No. 1 foundry	28 00@29	00	—4 mos
" " " "	2 "	26 00@28	00	—4 mos
" " " "	Mill	24 00@26	00	—4 mos
Car Wheel C. B		40 00,	nominal.	

STONE COAL.

Indiana No. 1 Foundry pig	Red Short	24 00@26	00	—4 mos
" 2 "	"	22 00@24	00	—4 mos
" 1 Forge	"	....@	....	—4 mos
" 2 "	"	....@	....	—4 mos
Ohio No. 1 Foundry pig	Cold Short	25 00@26	00	—4 mos
" 2 "	"	24 00@25	00	—4 mos
" Mill		23 00@24	00	—4 mos
" No. 1 Foundry,	Neutral	26 00@28	00	—4 mos
" No. 2 "	"	25 00@27	00	—4 mos
Merchant Bar		2½c.	—3 mos	
1st quality C. H. No. 1 Boiler Plates, per lb		5 c.	—3 mos	
1st " Com. sheet for No. 24, W.G. "		4 c.	—3 mos	
1st " Charcoal Sheet " " "		5¼c.	—3 mos	
Best Bloom Galvanized Sheet, discount 20 per cent			—cash.	
2d quality " " "	30 "		—cash.	

f. o. b. in Indianapolis.

Louisville. Oct. 19, 1875.

Specially reported by Messrs. GEORGE H. HULL & Co.

The mills and foundries, as a general thing, are full of work, and there is more demand for iron, but prices show no improvement.

The usual time, four months, is allowed on the quotations below.

HOT BLAST—CHARCOAL.

No. 1 foundry, from Hanging Rock Ores		$25 00@26	00	
No. 2 " " "		23 00@24	00	
No. 1, Mill, from " "		22 00@23	00	
No. 1, foundry, from Alabama, Georgia and Tennessee ores		23 00@24	00	
No. 2, foundry, from Ala., Geor'a and Tenn. ores		21 00@22	00	
No. 1, Mill, from " " " " "		22 00@23	00	

HOT BLAST—STONE COAL AND COKE.

No. 1, foundry, from Hanging Rock ores		23 00@24	00	
No. 2, " " " " "		22 00@23	00	
No. 1, Mill, " " " "		21 00@22	00	
No. 1, foundry, from Ala. Ga. and Tenn. ores		23 00@24	00	
No. 2, " " " " "		22 00@23	00	
No. 1, Mill, " " " "		21 00@22	00	
No. 1 foundry, from Missouri ores		24 00@25	00	
No. 2 foundry, from Missouri ores		24 00@25	00	
Fo. 1 Mill, from Missouri ores		26 00@27	00	

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock ores		35 00@40	00	
" " Tennessee "		28 00@30	00	
" " Alabama and Georgia ores		28 00@30	00	
" " Kentucky ores		28 00@40	00	

Milwaukee. Oct. 20, 1875.

The following are the present prices, per ton of 2,240 lb.:—

Frankfort L. S. Charcoal,	No 1	$30 00
" " "	No. 2 & 3	28 00
" " "	No. 4 & 5	31 00
" " "	No. 6	35 00
Mil. Anthracite L. S.,	No. 1	30 00
" " "	No. 2	28 00
Wisconsin Iron,	No. 1	26 00
Mahoning Valley Bit's	No. 1	32 00
" " "	No. 2	30 00

Pittsburgh. Oct. 20, 1875.

PIG IRON.—There has been no change for the better since the date of our last report; trade continues exceedingly dull, and with another suspension announced, the outlook is anything but encouraging. Very few of the mills are running to their full capacity and many are stopped; there is no disputing the fact, that the general position of the market is favorable to the buyer, and but for the very light stock, which here and at those points tributary to this market is reduced down lower than it has been for several years, prices could not possibly be maintained. Foundry irons are just as dull as mill, with but little prospect for an improvement soon.

MANUFACTURED IRON.—There are no encouraging features to report, and with the exception of sheet iron, for which there is considerable inquiry, in consequence of the failure of some western sheet mills, trade continues very dull and unsatisfactory. Some of our oldest mills report that they are almost out of orders. Several mills have been stopped recently, some voluntarily, others by financial embarrassments.

STEEL.—There is nothing new to report in this branch of trade; business continues fairly active, the best evidence of which is that the mills are, so far as we can learn, all in operation.

PIG METAL SALES REPORTED FOR THE AMERICAN MANUFACTURER FOR THE WEEK ENDED OCTOBER 20, 1875.

BITUMINOUS COAL OR COKE, SMELTED FROM L. S. ORE OR L. S. AND NATIVE.

10 tons No. 2 foundry	$25 00	1 mos.
30 tons No. 2 foundry	24 00	cash.
50 tons gray forge, C. S.	24 oc	5 mos.
230 tons gray forge	23 25	1 mos.
100 tons gray forge	23 00	4 mos.
30 tons gray forge N	22 50	cash.
110 tons gray forge close	P. T.	

CHARCOAL.

30 tons No. 1 foundry, H. R.	$28 00	4 mos.
170 tons No. 2 foundry, H. R.	P. T.	

Richmond, Va. Oct. 16, 1875.

Reported by ASA SNYDER, Esq.

No change in the iron market worthy of notice.

San Francisco, Cal.

From the *Commercial Herald*, of October 7, 1875.

The ship *Eric the Red*, from Liverpool, brought 1,200 boxes of tin plate, 215 tons pig iron, etc. The *Idaho*, from Oregon, brought a small invoice of 25 tons pig iron; price nominally $38. The *Rival*, from same place, brought 40 tons. The stock of pig iron is excessive, having been largely increased by recent arrivals. The spot price for Scotch is $35@36; the same, to arrive, $32@33. The market for all sorts of manufactured goods is exceedingly dull and inactive, and quotations are more or less nominal, being simply jobbing rates. Pig iron is now in full stock. The demand for tin plate is surprisingly small, and quotations are entirely nominal. The stock is thought to be large. The supply of Sidney pig tin is liberal, with a limited demand, price 22½c. Banca tin is held at 25@26c. The stock of yellow metal is not large, and when suits are required they are ordered from the East by rail. The market for American cast steel is well supplied, and is fast taking the place of best brands of English. The trade are carrying large stocks of manufactured iron—bar, sheet, bundle, etc.—prices of which remain the same as for a long time past. SELBY'S pig, sheet, and bar lead is in good stock, and prices are unchanged.

St. Louis. Oct. 19, 1875.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

We have nothing new to report in regard to the workings of our market. The demand remains about the same, and prices continue to rule low, with no present prospect of advancement.

BITUMINOUS.

Missouri, No. 1	$27@28	Massillon A No. 1	$35@36
" " 2	$25@26	" B " 1	$33@34
" " 1 Mill	$24@25	" " 2	$32@33

CHARCOAL—HOT BLAST.

Missouri, No. 1	$27@28	Tennessee, No. 1	$26@27
" " 2	$25@26	" " 2	$24@25
" Mill	$24@25	" Mill	$23@24
Hanging Rock, No. 1	$28@29	Georgia, No. 1	$28@—
" " " 2	$26@27	" " 2	$26@—
" " 3	$25@26	" Mill	$24@—

CHARCOAL—COLD BLAST.

Missouri Car Wheel	$33@35	Tennessee " "	$33@35
Alabama " "	$33@35	Hanging Rock "	$5c@53

MISSOURI BLOOMS AND BILLETS.

Charcoal Blooms	$75@85	Hammered Billets	$90@100
Scrap "	$70@75		

Sundry Quotations.

Fire Brick per 1000 (B. KREISCHER & SON)	$40@45@50 00
Clay retorts 12x20@15@30	30@45 00
Tiles and blocks per 100 cubic inches	12
Ground clay per bbl	2 50
" brick "	4 00
Rosedale cement per bbl	$ 1 15@ 1 20
Portland " "	3 50@ 4 25
Roman " "	3 50@ 4 25
Keenes coarse cement per bbl	8 00@ 8 50
" fine " "	12 00@12 50

METALS.

NEW YORK, Friday Evening, Oct. 22, 1875.

Business in most articles has shown a falling off for the last week, although there is still a fair amount doing in a small way. Prices in London, according to cable advices, have continued very steady. Mail advices dated the 8th inst., report a very fair business doing, with purchases being made only for current necessities.

Gold Coin.—During the week past gold has ranged from 115⅛@117, and closed at 115⅝.

Bullion.—Fine silver bars is quoted at $1 22@1 23, gold, per ounce, and fine gold bar at par ($20 67 gold, per ounce,) to ¼ pent. premium.

Copper.—We are reported sales of about 350,000 lb. of "spot" copper, at 23c.@23¼c., and 500,000 lb. "future" for delivery during November and December, at 23c., 23¼c. and 23¼c., 150,000 lb. having been sold to-day at 23¼c. There are negitiations going on for the purchase of the balance of this year's product of the mining companies, which, it is estimated, will be from 5,000,000 to 7,000,000 lb. The present condition of business does not warrant this movement, but it is said that the Combination has sufficient capital at its back to enable it to carry the stock until a day when it thinks there must be a profit; but, with advancing rates of interest, cost of storage, the necessity of occasional sacrifices in sales of surplus on foreign account, it seems as though the venture would be a losing one. The demand from consumers is light, with not very encouraging prospects for the early future. Chili Bars, in London, are quoted, by cable, to-day, at £82 10/, firm. Mail advices, dated the 8th ins., report the charters of Chili for the last half of September, at 900 tons for England, and 600 tons for France—all in bars and ingots. This news imparted more firmness to the market.

Tin.—The business done during the past week was entirely of a jobbing nature. We quote: Straits Refined and L. & F., nominally at 19¾@20c., gold; and Bancs at 24c. Straits was quoted, by cable, to-day, at £86. Wednesday's cable information quoted the Singapore market at $23 50 per picul.

Lead.—150 tons of Selby lead were sold from dock, at 5·60c. gold. This is said to be the last lot of this kind on the market or to arrive until after the Selby works are reorganized. There is a rumor, however, that Messrs. FLOOD & O'BRIEN have purchased a controlling interest in these works; in which event it is supposed that work will be resumed at a very early day. 20 tons of Richmond lead sold at 5·62½c., at which price it is now quoted. About 100 tons of other brands sold at prices ranging from 5·65c.@5·75c. Foreign, without business, is nominally quoted at 7⅛c.@7¼c. gold.

Spelter and Zinc.—Domestic is firm at 7¼c. currency, 30 days, with sales of 30 to 40 tons. Sheet zinc is quiet but firm at 9c. gold.

Antimony.—There is a moderate quantity of business doing at 13½c.@14c. gold. London advices quote at £59.

Quicksilver.—The price in this city is 87½c, ; in San Francisco, 82½c. per lb. Our latest London advices are by mail and dated October 8th, quoting at £14 14/.

FINANCIAL.

New York Stocks.

FRIDAY, October 22, 1875.

With but few exceptions, and those of only secondary importance, a gradual improvement has taken place in the New York Stock Market during the week. At the close of business to-day, the market was firm at the highest quotations attained during the week. Delaware, Lackawanna and Western Railroad stock shows an advance of nearly 2 per cent., with transactions amounting to over 4,000 shares. The stock of the Central Railroad of New Jersey with sales of nearly 3,000 shares exhibits an improvement of ½ per cent. Quicksilver Mining Company's stock, both common and preferred, has advanced under increased sales. The stock of the St. Louis and Iron Mountain Railroad Company is down to 13. The bonds of this company are unchanged. A general improvement is noticeable in the quotations of bonds with a moderate amount of sales.

The Sharpsburg and Lawrenceville Bridge Company, of Sharpsburg, Pa., has declared a dividend at 6 per cent. payable on demand.

The Baltimore and Ohio Railroad Company announces a dividend of 5 per cent. on the stock of the main line, payable at Baltimore, Nov. 1st. American Gas Coal stock is quoted at 20. Sales of some 2,000 shares of the Atlantic Coal Company's stock have been made at the Baltimore Stock market during the week at 250.

The annual meeting of the Hampshire and Baltimore Coal Company was held in New York yesterday.

Quotations and Sales of Stocks and Bonds,

For the week ending Oct. 22, 1875.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	275	—
Consolidation Coal Co	45¾	45¼	45¾	350
Spring Mt. Coal Co	—	—	167⅛	—
American Coal Co	—	—	47	—
Maryland Coal Co	—	—	16½	200
Del., Lack., and West. RR. Co	120	118¾	120	4255
New Jersey Central RR. Co	104½	103¼	104½	2692
Delaware and Hudson Canal Co	120	119¾	120	160
Quicksilver Mining Co. pref'd	23¾	22½	22½	750
" " " Common	19	17½	18¾	1400
Mariposa Land & Min. Co. various	10½	9½	9½	200
St. Louis & Iron Mountain RR.	—	—	13	15
Lehigh & Wilkes-Barre Coal Co	—	—	—	—

Total Shares sold 10022
Sales for the week previous 28131
Decrease 18109

† Asked.

BONDS.

	Sales.		Price
Ches. & O. R. R. 6s, 1st	—	—	— @ 30
" " " ex coupon	—	—	— @ 25
Central RR. of N. J. 1st Mtg. N	5,400	—	— @112
" " " 1st Cons.	12,000	—	107⅛@107¾
" " " Cons. Convt.	—	—	— @108¾
Del. and H. Canal, 1st Mtg. '84	6,000	—	— @110
" " 7s, '77	—	—	— @104
" " Reg. '91	1,000	—	— @112½
Del., Lack. & W. R. R., 7s, conv.	10,000	—	— @118¾
" " " " 2d Mtg.	—	—	— @112
St. Louis & Iron Mount'n 1st Mtg.	1,000	—	— @ 90¾
St. Louis & Iron M'tn, 2d Mtg.	—	—	— @ 54¾
Lehigh & Wilkes-Barre Cons.	2,000	—	95⅛@ 95¾

Total Sales $37,000

Closing quotations in the absence of sales, represent the latest prices bid.

Philadelphia Stocks.

PHILADELPHIA, Oct. 22, 1875.

The week's operations at the Philadelphia stock market have been characterized by no feature of special interest. Sales for the week have been made principally at our last quotations. The aggregate amount of sales is less by nearly 12,000 shares than last week's report. The market at the close of to-day was reported at a fractional advance throughout the list.

Bonds are generally lower, with quite a falling off in sales.

$16,000 of the 1st Consolidated Mortgage 6s of the Moselim Iron Company, were sold at auction on the 19th inst. at 65.

The Pennsylvania Salt Manufacturing Company holds its annual election to-day.

Quotations and Sales of Stocks and Bonds,

For the week ending Oct. 22, 1875.

STOCKS.

	Highest	Lowest	Closing	Shr's
Lehigh Valley RR. Co	62¼	61¾	62¼	842
Pennsylvania RR.	51	50⅝	51	18400
Reading RR.	56	55⅛	55⅞	1332
Lehigh Coal and Nav. Co	50⅝	50⅛	50⅝	4885
Buck Mountain Coal Co.	—	—	—	—
Fulton Coal Co.	—	—	3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co.		—	80	—
St. Nicholas Coal Co.	—	—	1	100
Cambria Iron Co.	—	—	16	500
Crane Iron Co.	—	—	—	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	77	76¼	77	62

Total shares sold 26,12
Sales for the week previous 37,73
Decrease 11,617

BONDS.

	Sales.		Price
H. and B. T. RR. 1st mortgage, 7s	—	—	@103
" " " 2d " "	—	—	@102
" " " 3d " cons	3,000	—	@ 52
Lehigh Valley RR. 6s, '98	—	—	@104¼
" " " 7s, 1910	—	—	@108¾
" " " con. mtge. 6s reg	20,000	—	@ 99¾
Pennsylvania RR., 1st mtge. 6s	3,000	—	@104
" " gen. " reg. 1910	—	—	@101
" " gen. " 6s, cou	3,000	—	@101½
Phil. & Reading RR. 6s,	—	—	@104
" " deb. bonds	6,000	—	80½@ 81
" " " G. M. 7s, cou. 1911	1,000	—	@103¼
" " " " 7s, Reg	1,000	—	@108¾
" " new convertible 7s, '93	16,200	108	@108¾
Phil. & Reading C. & I. Co. 7s deb. '92	—	—	@ 82½
" " " 6s	—	—	@ 91½
Lehigh Coal & Nav. Co., 6s '84	19,350	101	@101¼
" " " RR., '97	1,000	—	@102½
" " " '77	—	—	@ 96½
" " " conv. gold '82	—	—	@104¾
" " " gold, '97	3,500	103⅜	@104
Penn. Canal, 6s	—	—	@ 69
Penn. and N. Y. Canal, 7s	—	—	@107½
Susquehanna Coal Co. 7s	—	—	@ 70
Buck. Mount Coal Co. 6s	—	—	@ 97¾

Total amount of sales $77,050

Closing quotations, in the absence of sales, represent th latest prices bid.

Gold and Silver Stocks.

SAN FRANCISCO, Oct. 20, 1875.

A decline of $4 in the shares of the Eureka Consolidated Mining Co., and a slight falling off in Ophir and Mexican, are the only exceptions to a still further advance in the San Francisco Stock list. The market is reported as buoyant, with extensive transactions.

The total product of the Consolidated Virginia Mine, from Jan. 4th to Oct. 4th, amounted to $13,509,000.

The expenses of the mine during the same period have not been definitely ascertained, but they are estimated at about $2,500,000, leaving a profit of $11,009,000 for the nine months, out of which dividends amounting to $8,208,000 have been paid. The proportion of gold, as compared with silver, found in the ore, has increased from 35 per cent. to 50 per cent., and that of silver has decreased from 65 per cent. to 50 per cent.

The bullion product of the Crown Point mine for the month of September amounts to $135,000. The Chollar Potosi Mining Co. extracted 357 tons of ore for the week ending Sept. 9th, the average assay value of which was $30.50 per ton. Assessments, delinquent, at dates affixed: Savage, $5; this assessment is on the first issue of the stock of this Co, and, therefore, amounts to only $80,000. Nov. 10th; Baltimore Con., $1, Nov. 10th; Overman, $3, Nov. 16th; Belmont, 50c., Nov. 1st; North Con, 50c., Nov. 11th; Rock Island, 50c., Nov. 10th; Maxwell, $10, Nov. 12th; Baltic Con., 10c., Nov. 13th; Mansfield, $1, Nov. 17th; Union Con., 50c., Nov. 15th; Excelsior, 5c., Nov. 10th. Eldorado South Con. Mining Co., Nov. 16th. A dividend of $1 per share is announced by the Northern Belle Mining Co.

The ore body recently opened in the Justice mine, on the Comstock Lode, is found to extend in a vertical direction from the 300-foot level, where it is 10 feet thick, to the 600-foot level, where it is upwards of 40 feet thick. Assays of samples from the entire vein yield from $400 to $500 per ton. The width of the lode, from the hanging wall to the foot wall, is ascertained to be 132 feet.

The Ophir mine is producing sufficient ore to keep the Winfield, Nevada and Empire State mills running full; on the 6th the three mills shipped $38,806 in bullion. The Imperial mine has increased its milling facilities by the addition of the Boston mill, which will treat fifteen tons per day.

The Lyon Mill and Mining Company paid to-day $25,000 in dividends for the past fiscal month. The Colbert Gold Mining Company has been organized in San Francisco with a capital of $3,000,000. The Branch Mint received last week five bars of pure silver bullion from Senator JONES' Panamint mines, the aggregate weight of which was a little over one ton. The Northern Belle mine is shipping from $5000 to $8000 in bullion per day.

The Eureka Consolidated Silver Mining Company has passed into the joint control of the Nevada Bank and the Bank of California, Judge HEYDENFELT representing the former and A. P. K. HARMON the latter bank in the board of trustees just elected The Eureka Company has a share capital of $5,000,000, upon which, until within a month or two, dividends of 24 per cent. per annum (coin) have been regularly paid. The Eureka Mine is in the Eureka district of Lander County, Nevada, and is on the same vein with the Richmond Consols (English) and the K. K. Consolidated Mines. Its ores are principally argentiferous galena, and are readily smelted. Heretofore the principal part of its base bullion product, in the shape of matte, and amounting to about $125,000 per month, were sent to the works of HENPEDEN & Co., Newark, N. J., for treatment.

The San Francisco Assaying and Refining Company has thrown out all business previously done on government account, which has amounted to $20,000,000 a year, and is now wholly employed on the bullion product of the Bonanza mines. Heretofore the United States Mints have controlled the mines, but now the Nevada Bank party, which has gradually absorbed the largest mines on the Pacific, intend, it is said, that the mints shall be subordinate adjuncts to the mining interest.

The total coinage of the Philadelphia, San Francisco, and Carson Mints for September amounts to $5,051,200.

QUOTATIONS:

	No. of shares.	Oct. 13.	Oct. 19.
Sierra Nevada	100,000	$14	14
Union Consolidated	100,000	9	9
Mexican	108,000	22	21
Ophir	108,000	64	62
California	540,000	60	62
Consolidated Virginia	108,000	298	304
Best & Belcher	100,800	49	50
Gould & Curry	108,000	18	20
Savage	16,000	81	86
Hale and Norcross	16,000	41	43
Chollar Potosi	28,000	68	73
Alpha Consolidated	30,000	17	18
Imperial	100,000	10	10
Yellow Jacket	24,000	61	70
Kentuck	30,000	12	13
Crown Point	100,000	22	24
Belcher	104,000	17	18
Overman	38,400	43	48
Caledonia	20,000	17	18
Raymond & Ely	30,000	29	30
Meadow Valley	60,000	3	3
Eureka Consolidated	50,000	18	14
Eureka G. V.	20,000	—	—

Copper Stocks.

Specially reported by WILSON W. FAY & Co., Bankers and Brokers, room 7 Traveller Building, 31 State street, Boston.

BOSTON, Thursday Evening, Oct. 22, 1875.

The Copper Market still remains in the same normal condition as previously reported, and until the outlook is better, it is likely to stay there for some time to come. Calumet and Hecla has advanced to 163½ bid., and with this exception the whole market is inclined to rule lower. The Home Savings Bank has had a run on it for the last days, the demand upon it increasing with each day; yesterday they paid out about $65,000, and hundreds went away unable to even get into the bank. The bank asserts its ability to pay all depositors, but there is a noticeable lack of clerical force in paying off the depositors, thereby paying out much less than they would otherwise, were there more tellers put on for this particular exigency. This, with mercantile failures and their effects, stagnates business for the time being, people looking to what they think they own before venturing on any new risks. Eastern R. R. shares have again been the feature of the week, fluctuating between $21¼ and $17, and closing at $16 to 16½. The closing prices will tell the whole story.

At a recent auction sale, 300 shares of the Silver Islet Mining Co. of Lake Superior, par value $100, hypothecated, sold at $100.

The American Mining Co. held its annual meeting here on the 19th inst

DESCRIPTION.	Par Value.	No. of Shares	CLOSING. Bid.	Asked.
Allouez	$50	20 000	$14¼	$14¾
Calumet and Hecla	50	80,000	163¾	164
Central	25	20,000	32 25	33 25
Copper Falls	25	20,000	6 00	6 50
Dana	25	20,000	.20	25
Duncan Silver	20	60,000	57	62
Franklin	25	20,000	13 00	13 50
Humboldt	25	20,000	25	27
Madisca	25	20,000	20	25
Menard	25	20,000	55	66
Minnesota	25	20,000	2¾	2¾
National	15	20,000	12 06	2 18
Petherick	25	20,000	70	75
Pewabic	25	20,000	5 00	5 50
Phenix	25	20,000	14¼	14¾
Quincy	25	20,000	40 50	41 00
Ridge	25	20,000	6 25	6 75
Rockland	25	20,000	45	50
Silver Islet	—	—	10	20
Star	25	20,000	25	30
Superior	25	20,000	18	20
Eastern RR			16 00	16 25

Gas Stocks.

NEW YORK, Oct. 22, 1875.

Gas stocks have been fairly active during the week, with the tendency generally upward. We note a decided advance in the shares of the Manhattan Gas Light Co., quotations of which are $312 per share, against $305 a week ago.

The Portsmouth, N. H., Gas Light Co. has declared a dividend of 4 per cent. payable on demand.

The regular monthly dividend of ¾ per cent. is announced by the San Francisco Gas Light Co., payable the 15th inst. Sales of the stock of this Co. for the week ending the 14th inst., have amounted to 200 shares, at from $95 to $96.

We note a recent sale of $2250 of the gold certificates of the Baltimore Gas Light Co., at $104½, also over 300 shares of the stock of the People's Gas Light Co. of Baltimore at from $26¾ to 26½.

The following list is corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad street, New York.

COMPANIES.	Cap. Stk.	Par.	Bid.	Askd.
Mutual Gas Light Co., N.Y. City	$5,000,000	$100	107	108
New York " " "	4,000,000	100	152	155
Metropolitan " " "	2,500,000	100	158	160
Manhattan " " "	4,000,000	50	312	
Harlem " " "	1,850,000	50	136	
Westchester Co. " New York.	466,000	100	100	
Brooklyn " " Brooklyn	2,000,000	25	250	
Citizen's " " "	1,200,000	20	154	155¾
People's " " "	1,000,000	10	101	102
Nassau " " "	1,000,000	25	135	
Metropolitan " " "	1,000,000	100	108	110
Williamsburgh " " "	1,000,000	50	150	
J. C. and Hob'n. G. L. Co. N.J.	386,000		160	
People's " " of J. C.			130	
Citizen's G. L. Co., Newark, N.J.				65
Hempstead " " L. I., N.Y.	40,000	100		100
Jamaica, " " " "	25,000	100		100
Citizens', Rochester, "		100	50	65
People's G. L. Co. Albany, "	1,000,000	100	45	
Mutual " Buffalo "	750,000	100	50	55
Troy G. L. Co., Troy, N. Y.			108	
Brockport, N. Y., G. L. Co.	25,000	100		90
Baltimore G. L. Co., Balt., Md.	2,000,000	100	190	192½
People's G. L. Co., Balt., Md	2,000,000	25	27	
Hannibal G. L. Co., Hanni., Mo.	100,000	100	90	
Lewiston G. L. Co., Lewis., Me	400,000	100		80
Chicago G. L. Co., Chicago, Ill.	2,000,000	100	135	
Derby G. L. Co., Derby, Conn.	160,000	100		80
Woonskt. G. L. Co. Woonskt, R.I.	150,000	100	100	
Fort Wayne G. L. Co. F. W., Ind		100		105
North. Liberties G. L. Co. Phila.		25	29¾	
Wilkes-Barre G. L. Co W. B. Pa.		50	70	
Washington G. L. Co., Phila.			42	43
Portland G. L. Co. Portland, Me	350,000	50	72	75
Hartford G. L. Co., Hartford, Ct	700,000	25	41	43
Boston G. L. Co., Boston, Mass.	2,500,000	500	780	
Chelsea G. L. Co. Chelsea, "	300,000		139	
Cambridge G. L. Co., Cam., "	700,000		132¾	
Louisville G. L. Co., Louis., Ky.			127	
Cincinnati G. L. Co., Cincin, O.			200	201
S. F. G. L. Co. San Francisco, Cal			93	93¼
City G. L. Co. Montreal, Canada	1,440,000	40	125½	127½
Consumers G. L. (old.) Tor., Ont	600,000	50	131	
Halifax G. L. Co., Halifax, N.S.		40	143	145

American Mines in London.

DIVIDEND MINES.

CLOSING PRICES—Oct. 9, 4 P. M.

No. of Shares.	MINES.	Par Value of Shares	Bid.	Total Dividends paid.	Last paid.
		£	£	£ s. d.	
10,000	Battle Mountain, c. (6240 sh.) part paid	5	....	0 10 0	Nov. 1872
15,000	Birdseye Creek. g. Cal.	4	1¾	0 14 0	June, 1874
40,000	Cedar Creek. g. Cal.	5	⅛	0 5 0	June, 1873
15,000	Chicago s. Utah	10	4	1 12 0	May 1875
21,000	ColoradoTerrible, s.-l. Col †	5	2	0 13 6	Jan. 1875
23,500	Eberhardt&Aur'a, s. Nev.†	10	7¼	1 0 0	July, 1871
60,000	Emma, g. s. Utah (35,000 shares part paid	20	1	3 12 0	Dec. 1872
15,000	Ferguson, g. Cal	2	....	0 3 0	Ap'l, 1872
30,000	Flagstaff, s. Utah	10	⅛	4 2 0	July, 1873
30,000	Gold Run, hydr, Cal.	1	⅛	0 2 4	Oct., 1872
20,000	Last Chance, s. Utah	5	⅛	0 14 0	July, 1873
65,000	London & California. g.†	2	⅛	0 1 0	July, 1875
15,000	Mammoth Cop.c. s. Utah	10	....	0 5 0	Dec., 1872
5,000	Mountain Chief, s. Utah.	10	....	0 4 0	Jan., 1873
54,000	Richmond Cons. s. Nev.	5	9¾	2 14 0	May, 1875
125,000	Sierra Buttes, g. Cal.†	2	1¾	1 14 0	July, 1875
60,000	South Aurora, s. Nev.†	5	⅛	0 14 2	Nov., 1873
15,000	Sweetland Creek, g. Cal. †	4	2⅛	3 0 0	Dec, 1874
20,000	Tolima, g. s. (14,000 sh., £4/10 pd.)	5	3	0 11 6	May, 1875

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		£ s.	£	
30,000	Blue Tent, hydr. g. Cal.	5 0	5/	Fully paid
12,000	Camp Floyd, s. Utah	10 0	....	" "
6,000	Clifton, s. Col	5 0	....	Feb., 1872
10,000	Crescent, g. Cal.	10 0	....	Fully paid
10,000	Douglas, s. Georgetown, Col.	5 0	....	" "
35,000	Excelsior, Hyd. Gld. Cal.	5 0	....	Dec., 1871
60,000	Exchequer, g. s. Cal	1 0	⅜	Fully paid
10,000	Goetzel Tunnel Co., Col.	7 0	....	" "
40,000	Holcombe Valley, g. C.	1 0	1	July, 1873
20,000	Independence, g. Cal.	5 0	2	Fully paid
20 000	I. X. L., g. s. Cal.	5 0	2⅛	" "
15,000	New Pacific, g. s. Nev.	0 10	5/	Dec., 1874
32,500	Ruby Consolidated, s.	10 0	....	Fully paid
15,000	Saturn, s. Utah	5 0	....	
10,000	Silver Plume, s. Col	1 0	....	Fully paid
37,500	Snow Drift, s. Col.	2 0	1⅛	" "
30,000	Tecoma, s. Utah	10 0	⅛	" "
14,000	Utah, g.. s -l. Utah	5 0	⅛	" "

c. copper; g. gold; s. silver; s.-l. silver-lead; † Quoted on the London Stock Exchange. All of the above are Limited Liability Companies.

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Announcements to Members and Associates.

I. THE ENGINEERING AND MINING JOURNAL, containing the official reports of proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues (ten dollars per annum) are payable on election and at the annual (May) meeting. Members and associates elected at the February meeting pay ten dollars only to May of the following year. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. Blank proposals for membership can be had on application to the Secretary.

IV. The Autumn meeting will commence at Cleveland, Ohio, on Tuesday evening, October 26, 1875.

Local Committee: Prof. J. S. NEWBERRY, CHAS. A. OTIS, FAYETTE BROWN, S. A. FULLER, W. C. ANDREWS.

Arrangements will be made for excursions to the Mahoning Block Coal Fields, to the Tuscarawas Black Band Ore Mines, to Kelly's Island, and to the various local Steel, Wire, and Oil Works.

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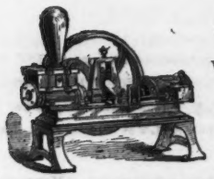

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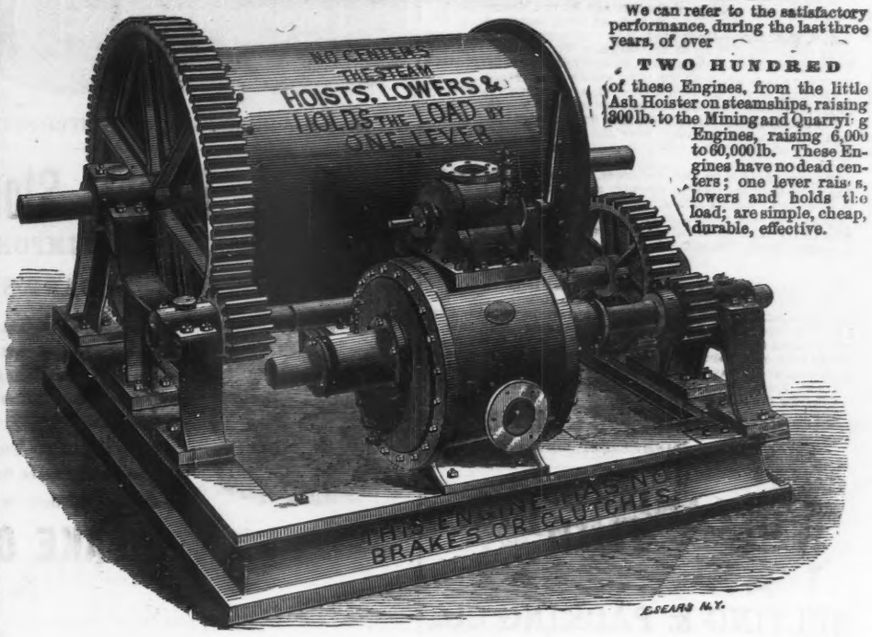

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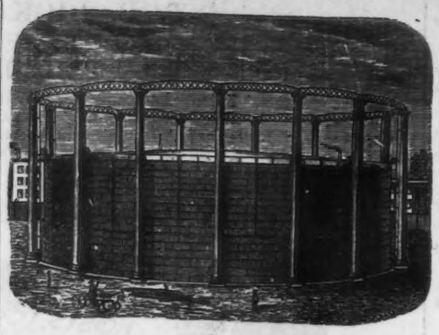

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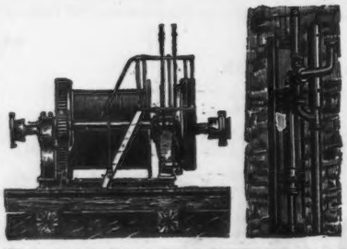

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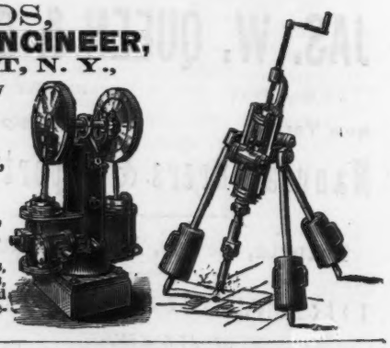

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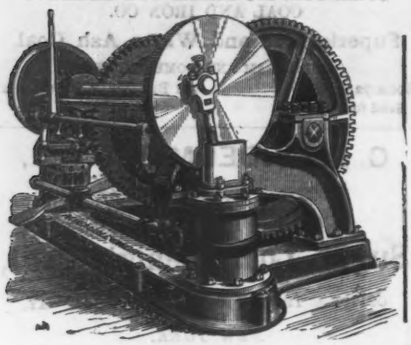

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